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LEPROSY.

McKinley (Earl B.). **The Etiology of Leprosy.**—Reprinted from *Medicine.* 1934. Dec. Vol. 13. No. 4. pp. 377–504. With 12 figs. [525 refs.]

This is in itself a comprehensive review of the bacteriology of leprosy for the past sixty years with 525 references, which should be read by all interested. The author concludes that there is still no absolute proof that Hansen's bacillus is the cause of leprosy, although no one doubts it, for it is not generally accepted that organism has been cultivated, nor has typical leprosy as seen in man been reproduced in lower animals. He is hopeful that his tissue cultures may yet prove successful, and the work of Reenstiern, himself and others on inoculation of monkeys is promising. Similarly the chemistry of the lepra organism is also much more deficient than that of the tubercle bacillus.

L. Rogers.

i. Nolasco (J. O.). *Mycobacterium leprae* **in Deep Organs in Fifteen "Quiescent" and "Arrested" Cases of Leprosy not demonstrated in Smears at Necropsy.**—*Far Eastern Assoc. Trop. Med. Trans. Ninth Congress, Nanking, China, 1934.* Vol. 1. pp. 705–713.

ii. Huizenga (Lee S.). **The Application of Sterilization in Leprosy.**—*Ibid.* pp. 783–790.

iii. Hoang-Pho. Un cas de paralysie générale d'origine lepreuse. [**G.P.I. of Leprotic Origin.**]—*Ibid.* pp. 721–723.

iv. Lai (Daniel G.). **A Bacteriological Study of Certain Immune Regions in Skin Leprosy.**—*Ibid.* pp. 725–727.

v. Reiss (F.). **Tuberculoid Leprosy, a Clinical Entity or a Histopathological Reaction.**—*Ibid.* pp. 699–704. With 6 figs. on 3 plates.

Of the 12 papers in this volume seven, noted by title only on pp. 554 & 555, relate to work of the same writers that has already been reviewed in this *Bulletin.* The following are the main points in the remaining papers.

i. J. O. Nolasco in continuation of previous work reports on the post-mortem examination for lepra bacilli in the tissues of 15 more "arrested" cases of leprosy. The organisms were not found by direct smears, but in 12 of them histological examinations showed the micro-organisms associated with typical foamy cells; in the remaining three the infection was

considered to be overcome, and in others the bacilli were believed to be undergoing intracellular digestion within the foamy cells, so they may have been dead. The importance of a follow up of paroled cases is emphasized.

ii. L. S. HUIZENGA reports on the presence of anhydrosis and alopecia in 200 lepers. They are nearly always found in active cases, and are attributed to destruction of the glands and the nerve ends by pressure of leprous infiltration. The face and extremities are most affected, but the general health does not suffer much.

iii. HOANG-PHO reports a case of general paralysis in a leper in whom he was unable to find evidence of syphilitic infection.

iv. Daniel G. LAI has made a bacteriological examination of the skin of certain regions reported by HOPKINS to be usually immune to evident leprous lesions, and in an examination of 83 cases he found that lepra bacilli were commonly present in small numbers as compared with adjacent infiltrated areas of the skin.

v. F. REISS has given, in addition to chaulmoogra preparations, sodium thiosulphate, which PALDROCK and POOMAN had found to have some action on lepra bacilli. He reports on seven cases, five of which showed marked and rapid improvement on the combined treatment, which he therefore suggests may be found by further work to be of value. *L. R.*

LEPROSY REVIEW. 1935. Jan. Vol. 6. No. 1. pp. 1–49. With 12 figs. (1 map) on 4 plates.—Quarterly Publication of the British Empire Leprosy Relief Association, 131 Baker Street, London, W. 1. [2s.]

In this number G. R. RAO reports a trial of brilliant green, trypan blue and Bonney's blue in 20 leprosy cases at Purulia with no appreciable effect on either the course of the disease or on the lepra bacilli.

Gordon A. RYRIE writes on the management of reactions following either over dosage or abrupt cessation of prolonged hydnocarpus treatment; concurrent disease such as syphilis, sepsis or helminthic infections; or possibly such foods as shell-fish, curries, etc.; drugs such as KI; or emotional stress. Cessation of hydnocarpus treatment for a full month after subsidence of the reaction is advised. Further comments on Dr. ROSE's article [*ante*, p. 328] and reprints of papers already dealt with in this *Bulletin* are included. *L. R.*

LEPROSY REVIEW. 1935. Apr. Vol. 6. No. 2. pp. 51–99. With 7 figs. (5 on 2 plates), 1 plan & 1 map.—Quarterly Publication of the British Empire Leprosy Relief Association, 131 Baker Street, London, W. 1. [2s.]

The first paper in this number is a valuable description of the well-known methods of examining leprous lesions for the causative bacillus for diagnostic purposes by that very experienced pathologist, H. W. WADE, which should be read in the original by those interested.

Spencer B. MCNAIR contributes a review of eye, ear, nose and throat work at the Carville Leprosarium, which is fortunate in having a specialist staff. A number of operations have been performed for the relief of ectropion. The electric cautery is advised in the treatment

of infiltrated areas about the limbus of the eye and ulcerated areas in the larynx. Corneal infiltration and iridocyclitis are major eye problems for which he advises atropine twice daily, salicylates for pain, and subcutaneous or intramuscular injections of foreign protein in the form of diphtheria antitoxin, haemoprotein of Brooks or a milk preparation, aolin. In chronic keratitis gold sodium thiosulphate intravenously, foreign proteins and instillations of 20 per cent. chaulmoogra oil and dionine into the conjunctival sac are recommended. The electric cautery is used in leprous lesions of the nose, followed by spraying 30 per cent. chaulmoogra oil in olive oil or chloretone inhalant. For stenosis the affected turbinate bone is removed. Tonsillectomy has frequently been performed. Tracheotomy may be required for laryngeal obstruction. Ear lesions are limited to the external portions.

R. G. COCHRANE commences in this number an account of his recent tour in the West Indies. In Jamaica under the Leper Asylum Law of 1896 pauper and indigent lepers were segregated and others were allowed to live at home under certain restrictions. The number in the asylum has averaged about 120 in spite of an increasing population; so he thinks the disease is diminishing, but the law may require modification and endemic foci should be sought for and the infected dealt with in leper colonies with land to cultivate. A special medical officer should be sent to the Trinidad Leper Settlement for study so as to be able to recognize early cases.

Barbados has compulsory segregation, but the numbers isolated have fallen during the decade 1924–34 from 173 to 75, and 55 more discharged cases receive monthly allowances and are prohibited from certain forms of work. The asylum is prison-like and requires ground around it. From the admission records the distribution appears to be patchy and surveys are needed to find and deal with the foci of infection to hasten the disappearance of the disease from the island.

The remaining papers are reprints, including the report on the Uganda settlement which appeared in the *East African Medical Journal*. (*Ante*, p. 331.) *L. R.*

LIE (H. P.). **The Curability of Leprosy.**—*Internat. Jl. Leprosy.* Manila. 1935. Jan.–Mar. Vol. 3. No. 1. pp. 1–22. With 8 figs. on 2 plates. [12 refs.]

This interesting historical paper on the treatment of leprosy in Norway, from the time that DANIELSSEN commenced work at the Bergen Hospital in 1839, brings out the foresight of that great worker in advocating attention to the patient's general health, the use of counter-irritants, a gold preparation, the production of reactions by potassium iodide, which he eventually recognized as harmful, and the use of Ol. gynocardiae—as chaulmoogra oil was then erroneously termed. Dr. Lie also records that a number of patients were found to be cured and free from lepra bacilli at later autopsies, and he emphasizes the tendency of the infection to die out in oldstanding cases, although this was infrequent, in 8 per cent. only in nodular cases. He also points out that "nodular patients who appear incapable of overcoming the bacilli may be completely cured when, for whatever reason, they are made to react. Here lies the most important problem regarding the therapy of leprosy, namely to bring about a reaction at as early a stage as possible." *L. R.*

COCHRANE (R. G.). **The Epidemiology and Prevention of Leprosy.**—*Internat. Jl. Leprosy.* Manila. 1934. Oct.–Dec. Vol. 2. No. 4. pp. 385–394.

In view of the increasing number of early cases of leprosy now seen, and the tendency of many of them to abort if the patients, mainly children, are kept under good conditions, the author thinks such may be watched without treatment, which should be reserved for active cases, together with isolation in an institution, or in huts in the patients' villages, of infectious cases. This will simplify prophylaxi, in which propaganda should play an important part. The analogies between leprosy and tuberculosis are also stressed. *L. R.*

ATKEY (O. F. H.). **Leprosy Control in the Southern Sudan. A Compilation from the Annual Reports for 1929, 1930 and 1931 on the Medical and Health Work in the Sudan.**—*Internat. Jl. Leprosy.* Manila. 1935. Jan.–Mar. Vol. 3. No. 1. pp. 73–79.

This article has been compiled from official reports that have already been dealt with in this *Bulletin.* The conclusions are come to that many early cutaneous cases remain stationary and do not require segregation, but that measure is very beneficial in highly infective cases. Treatment certainly tends to keep the disease from advancing, though not spectacularly curative ; improvement in food and conditions of living are most important measures. Bush dispensaries and providing treatment near the patients, with a central camp for highly infective lepers, are of value. *L. R.*

HOLLENBECK (H. S.). **Leprosy in Angola.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1935. Apr. 17. Vol. 28. No. 6. pp. 655–656.

Leprosy is widespread in Portugese West Africa, mainly in the nerve form, and appears to have increased on the plateau in recent years following deficient nourishment in partial famine years due to deficient rainfall. In 1925 the American Mission to Lepers supplied chaulmoogra oil for treatment in small colonies and camps with striking success from the first, for all the patients showed marked improvement in a few months ; the early ones were discharged symptom-free in 18 months, and there were no relapses in those kept under observation for 9 years. In some more advanced cases 2 to 3 years' treatment produced steady improvement, and all but two became symptom-free, nodular cases responding about as well as nerve cases. The treatment is so popular that a large proportion could be treated if funds were sufficient. *L. R.*

GOURVIL (E.). La lèpre au Soudan. [**Leprosy in the French Sudan.**] —*Bull. Soc. Path. Exot.* 1935. Jan. 9. Vol. 28. No. 1. pp. 7–10.

Among 19,263 young men examined during recruitment in the French Sudan 401, or 20·8 per mille, were found to be infected. In 1928 under compulsory segregation 30 lepers were isolated, but general hiding of cases occurred and the results were "deplorable." Voluntary home treatment was then sanctioned and in three years there were 31 in the lazaret, but 271 enrolled for treatment with freedom. Indisputable amelioration was obtained in a large number by means of intravenous injections of emulsions of chaulmoogra oil, together with

general treatment with Fowler's arsenical solution and codliver oil, a combination superior to the first oil alone. Marriage of lepers with healthy persons, and certain dangerous employments are forbidden. Obedience to the rules and assiduous attendance for treatment surpassed expectations. *L. R.*

i. STRACHAN (P. D.). **Leprosy and Leprosy Treatment in Basutoland.** —*Internat. Jl. Leprosy.* Manila. 1934. Oct.–Dec. Vol. 2. No. 4. pp. 431–439.
ii. DYKE (H. W.). **Leprosy in the Bechuanaland Protectorate.**—*Ibid.* pp. 441–442.
iii. JAMISON (R.). **A Note on Leprosy in Swaziland.**—*Ibid.* p. 443.

i. In Basutoland the lepers are isolated in the Maseru asylum with about 600 patients and 1,500 acres of land, and with a convalescent village of 40 to 50 discharged cases. With greater activity the patients have increased recently to 730, and fewer very advanced ones are now admitted. Intradermal injections are readily accepted, but many cases have become arrested without active treatment, which has been very variable in degree, so analysis is difficult. The present isolation policy is very expensive.

ii. This brief note records that in dry Bechuanaland (200,000) only 25 lepers have been seen in five years and the number is estimated at 40 to 50, or 0·2 per mille. They are so scattered that regular treatment has not proved to be practicable.

iii. In Swaziland (125,000) the incidence is also low with not more than 120 cases, or about 1 per mille. Local isolation in huts is now attempted and nearly all the cases are of the nerve type, for the author has only seen two nodular cases in many years' work. *L. R.*

DEL TORO CANO (Fernando). El problema de la lepra en Marruecos occidental español. [**Leprosy in Spanish Morocco.**]—*Medicina Países Cálidos.* Madrid. 1935. Feb. Vol. 8. No. 2. pp. 85–103. With 1 map, 10 figs. & 1 chart. [22 refs.]

Twenty cases are referred to in this article, 9 of the nodular type, one macular, two mixed, and eight others are mentioned but not the type. The proportion is said to be 1 per 14,000 population in Western Morocco, or half as many again as in Spain (1 in 25,000). The nodular type is said to predominate. The disease is indigenous and not imported from Spain but some are said to have contracted their infection in the French territory. Before adequate prophylaxis can be effected a leper census should be taken and a leprosarium ought to be established for dealing with patients found, and immigration of lepers from other nations should be prohibited. There is a map showing the districts affected; of the 20 cases four were in Ceuta, five (a sixth doubtful) in Tetuán, two each from Jolot, Beni Manzor and Guezaua, and one each from four other districts. *H. H. S.*

MUIR (E.) & CHATTERJI (K. R.). **The Record of a Leprous Village with a Scheme for a Statistical Survey.**—*Leprosy in India.* 1935. Jan. Vol. 7. No. 1. pp. 4–18. With 1 fig. & 1 map.

This is an important record of a careful survey of a leprous Mussulman Bengal village. It gives two family trees showing five generations, in both of which the disease began in the third generation, since

which 13 infective and 5 uninfective cases have occurred in one family, and 2 and 3 respectively in the other. A plan of the house infections is also given. Of the 23 cases in 46 years 19 survive, including 10 infective ones, who are now all isolated voluntarily in the village. The spread of the disease was apparently due to family relationship and closeness of residence, no less than 15 of the patients having probably been infected by one case. There is usually an average period of 6 years between the appearance of the first symptoms and the development of an infective stage, but, omitting one case, the average time was 3½ years. The value of such a careful survey, with resulting voluntary isolation of all the infective cases is obvious, and schedules are given to assist surveys. *L. R.*

i. SANTRA (I.). **A Note on Leprosy Work in the Salem District.**—*Leprosy in India.* 1935. Jan. Vol. 7. No. 1. pp. 23–25.
ii. ——. **Notes on Leprosy in Japan.**—*Ibid.* pp. 26–32.

i. This brief note records the progress of widespread dispensary treatment in the Salem District of Madras. The author concludes that "treatment alone has a very great value in the control of the disease" and should not be discouraged by those who advocate segregation measures.
ii. This is a brief description of Japanese leper institutions seen during a short visit to the country. *L. R.*

KANG (T. I.) & WILSON (R. M.). **Statistical Data of 709 Korean Cases of Leprosy.**—*Internat. Jl. Leprosy.* Manila. 1934. Oct.–Dec. Vol. 2. No. 4. pp. 447–451.

An analysis showed 59 per cent. males and 41 per cent. females. In 30·3 per cent. the patients had lived with other lepers, brothers being the most frequent relationship. The disease was contracted in the first decade of life in 11 per cent., in the second in no less than 52 and in the third in 25 per cent., leaving only 12 per cent. over the age of 30 years. Poverty and deficiency of protein in the diet predisposed. Neural cases were 45, cutaneous 45 and mixed 11 per cent. Treatment was by chaulmoogra oil intramuscularly, with an average of 64 injections per case in 1933, with the result that 44 per cent. were arrested without deformities, and 42 per cent. more with deformities, with about equally good results in nerve and cutaneous cases, so the "results of treatment are encouraging." *L. R.*

LEE (H. S.). **The Statistical Observation of the Leprosy at Taiku Leper Hospital.**—*Japanese Jl. Dermat. & Urol.* 1934. Dec. Vol. 36. No. 6. [In Japanese pp. 651–657. English summary p. 113.]

Among 450 cases seen at Taiku, Korea, 427 were classed as early, with disturbance of sensation in 86·7 per cent., anhydrosis in 18·7, pemphigus in 32·8 and depigmentation in 21·7 per cent. The lesions were mostly found where mechanical pressure occurs frequently, and the patients mainly between the ages of 12 and 20 years, the disease beginning in the spring and affecting farmers most. *L. R.*

WAYSON (N. E.) & RHEA (Theodore). **Leprosy. Observations on its Epidemiology in Hawaii.**—*Public Health Bull. No. 212.* Wash. 1934. Sept. 32 pp. With 7 figs. [15 refs.]

This is an interesting statistical study of the incidence of leprosy in the Hawaii Islands, with tables and charts of data since they were more accurately kept from 1890.

After a brief discussion of the history of the disease, data are given regarding the variations in the mixed population, which show a decrease of pure Hawaiians and increase of half-breeds. The incidence of the disease shows a steady decrease in the admission rates during the last five decades, from 3·6 per mille in 1890–1900 to 1·3 per mille in 1920–30, especially among the younger ages; this is attributed to, or coincident with, "general biological and environmental influences which are evidenced by falling death rates from other causes, rather than as a result of specific control measures." No evidence of definite racial susceptibility was found, and the sex ratio was 1 female to 1½ males, although up to the eighth year the ratios are practically equal, and the later excess in males is unexplained. Children under 15 are more frequently affected than older ones, especially in families with more than one case. Adolescence and pregnancy favour its development. Family incidence showed 3 or more cases in 10 per cent. and 2 or more in 30 per cent. of households. Among 420 families there were 600 admissions, or 20 per cent. of the total members, and 43 per cent. came from 14 families. Among a number of admissions between the ages of 10 and 15 the leprous condition had often been recognized three or more years before admission. The period of incubation could not be ascertained, and it is probably influenced by the degree of exposure to infection, for leprosy appears to be highly communicable under certain conditions. Poverty and diet deficient in animal proteins predispose, for the disease was most prevalent in rural conditions among families who had no milk or butter and inadequate vegetables and fruits, while calcium and vitamins B and C were also deficient. *L. R.*

MACLEOD (J. M. H.). **Leprosy in Great Britain. The St. Giles Homes for British Lepers.**—*Internat. Jl. Leprosy.* Manila. 1935. Jan.–Mar. Vol. 3. No. 1. pp. 67–70. With 3 figs. on 1 plate.

This is a very brief account of the St. Giles homes for British lepers. At a guess there are from 50 to 100 cases in Great Britain, almost all contracted in some part of the Empire abroad. The home was started in 1913 in a remote part of a home county by adding to farm buildings, and it is usually fully occupied by 12 male and 2 female lepers.

L. R.

COCHRANE (R. G.). **Leprosy in England.**—*Internat. Jl. Leprosy.* Manila. 1935. Jan.–Mar. Vol. 3. No. 1. pp. 71–72.

This brief note is on similar lines to the above, but mentions that although infections are rare in this country the author has heard of three and possibly a fourth, but he "subscribes to the general view that conditions in England do not tend to cause the spread of leprosy." The latent period may sometimes extend to a number of years, and

cases are often overlooked by medical men in this country for want of clinical experience until they have reached the second or third stage of the disease, when the prognosis is poor. *L. R.*

MUIR (E.). **The Relationship of Skin and Nerve Leprosy.**—*Indian Jl. Med. Res.* 1934. Oct. Vol. 22. No. 2. pp. 383–392.

This is a histological study of early lesions with a view to elucidating the relations of skin and nerve lesions, from which the following conclusions are drawn.

The infection spreads along the vascular plexuses of the sub-papillary and subcutaneous tissues up to the cutaneous nerve branches from the skin, the extension of the disease being lessened by natural and acquired resistance and favoured by any form of lowered resistance. The degree of cellular response is in proportion to the number of lepra bacilli in the tissues, with more rapid spread in young children and debilitated subjects, and less in older subjects with greater resisting powers, in whom it may cease to progress as long as the general health is good. The dermal nerves may show the highest number of bacilli owing to the lower resistance of nerve tissues. As subliminal infections increase immunity it is suggested that injections of suspensions of *M. leprae* in the form of leprolin may further increase the resistance, especially if injected around lesions showing cellular response, and also perineurally. Injections of 1 in 10 and 1 in 20 Hansen's leprolin intradermally into the macules and around their margins appear to be promising, intervals of one or two months being sufficient in some cases. They should not, however, be used in advanced cases with low resistance except in those negative to Hansen leprolin, but positive to Stefansky's leprolin, when the latter may be used. The leprolin test is also of great value as a guide to discharging advanced nodular cases, who should be kept under observation until a moderately strong reaction is obtained to Hansen's leprolin. *L. R.*

ITAKURA (Teiju). Zahnärztliche Untersuchungen bei Leprakranken. I. Bericht: Befunde ueber Zahnausfall, Weisheitszahnausbruch und Zahnkaries besonders bei leprakranken Formosa-Chinesen (Fokien-Stamm). [**Dental Studies in Leprosy.**]—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1935. Feb. Vol. 34. No. 2 (359). [In Japanese pp. 195–211. [31 refs.] German summary pp. 211–213.]

Data are recorded from a study of the dental changes in 162 Formosan lepers, who did not show very striking differences from those of normal persons. The longer the duration of the disease the worse the dental conditions. The average loss of teeth in the lepers was 3·64, or apart from the wisdom teeth 1·81, and there was no difference between nerve and nodular cases. The average number of carious teeth in lepers was 2·40, and there were more in women than in men and in nerve than in nodular cases. In summing up the author says that he found no great difference between the teeth of lepers and healthy persons, but it is interesting to note that there was proportionately more severe disease of the front teeth of the upper maxilla than of the other teeth of lepers. *L. R.*

BARGEHR (Paul). Zur Leprafrage. [**The Leprosy Question.**]—*Muench. Med. Woch.* 1935. Jan. 10. Vol. 82. No. 2. pp. 56–57.

The author deals further with the results of his cutireaction in leprosy in relation to epidemiology and immunization. A sterile extract of lepromata rich in bacilli is injected intradermally and the results are given in four classes: 1. Those who have never come into contact with lepers give a negative reaction, as there has been no opportunity for the formation in the system of antibodies. 2. Those who have lived for long in contact with lepers, but have remained healthy, give a positive reaction, because as the result of infection they have developed antibodies which have destroyed the infection. 3. Persons who have developed active bacteriologically positive leprosy give a negative reaction, because they have developed antibodies insufficient to overcome the infection. 4. Persons who have lost all active symptoms of leprosy, and passed into a quiescent recovered stage, give a positive reaction, because they have developed sufficient antibodies. He also maintains that by giving 2 to 4 or more intradermal injections of his leprolin immunity can gradually be produced, and he thinks this may prove of value in combating the disease. *L. R.*

MUIR (E.) & CHATTERJI (K. R.). **Factors influencing the Spread of Leprous Infection.**—*Indian Med. Gaz.* 1934. Sept. Vol. 69. No. 9. pp. 495–500. With 3 figs. & 6 charts.

The first part of this paper deals with the leprolin test on the lines of his previous ones. In the second part the author records with diagrams the incidence of leprosy in six affected families, and he points out that of 17 persons in house contact with lepers up to six years of age 10 had already become infectious cases; all from persons classed as infectious. The young, who are usually positive to the leprolin, are much more susceptible than non-reacting adults owing to lower resisting power. *L. R.*

TISSEUIL (J.). Quelle est la durée minima d'incubation de la lèpre? [**Minimum Incubation Period of Leprosy.**]—*Bull. Soc. Path. Exot.* 1935. Feb. 13. Vol. 28. No. 2. pp. 60–62.

Infection in infants has been studied to find the shortest incubation period, and in several cases this has been found to be only three months owing to the great susceptibility of young children. *L. R.*

CHIYUTO (Sulpicio). **Early Leprotic Changes in Children and their Bearing on the Transmission and Evolution of the Disease. II.**—*Monthly Bull. Bureau of Health.* Manila. 1934. Dec. Vol. 14. No. 12. 34 pp. [18 refs.]

This paper is a continuation of a previous study of 40 cases in the Philippines [this *Bulletin*, Vol. 31, pp. 5 & 866] and confirms the data of the earlier one. The most common lesions noted are multiple depigmented areas or macules in 35 per cent. of the cases, minute papular-vesicular eruptions in 42·5 per cent., and in 41·6 per cent. of cases formerly without nerve symptoms small areas of anaesthesia have developed. Since the last report 27·5 per cent. of the lesions

have remained stationary, 20·0 per cent. have slightly advanced, 35 per cent. moderately, and 17·5 per cent. markedly so. In all only 22·5 per cent. have progressed to typically leprous manifestations.

L. R.

LARA (C. B.) & DE VERA (B.). **Clinical Observations with Reference to Leprosy in Children of Lepers.**—*Jl. Philippine Islands Med. Assoc.* 1935. Mar. Vol. 15. No. 3. pp. 115–129.

These workers have examined 240 children of leper parents and 78 control ones for skin lesions suspected by CHIYUTO to be early leprosy, and, with the exception of enlarged cutaneous nerves, contracture of the fingers and flushing of the legs, they met with them also in the children of non-leper parents, the hazy pale areas being found in 50 per cent. of the latter class. The depigmented areas, goose-flesh condition and the neurotrophic changes were also found in similar aged children of non-leper parents, the last in even greater numbers than in the children of lepers, but markedly ichthyotic condition of the legs was more common in the latter class. The total incidence of suspected lesions among the children of lepers was far less than CHIYUTO reported. *L. R.*

WADE (H. W.) & LE ROUX (J. J. du Pré). **A Leprosy Case Progress Chart.**—*Internat. Jl. Leprosy.* Manila. 1935. Jan.–Mar. Vol. 3. No. 1. pp. 33–42. With 3 figs. & 1 folding chart.

This chart will be of value in enabling systematic clinical records to be made of leprosy cases. *L. R.*

TÔYAMA (Ikuzo) & ISHIZU (Shun). Ueber den leprösen Haarausfall. (Klinische Untersuchung.) [**Loss of Hair in Leprosy.**]—*Japanese Jl. Dermat. & Urol.* 1935. Jan. Vol. 37. No. 1. [In Japanese pp. 56–95. With 22 figs. [19 refs.] German summary pp. 9–40.]

This is an elaborate tabulated analysis of the incidence of loss of hair in leprosy patients, of whom 20·8 per cent. showed no loss of hair, and 79·2 did show such loss. The eyebrows were affected in 80 per cent., the head in 69, the beard in 43, the axilla in 50 and the pubic hairs in 47 per cent. Females suffered slightly more often than males, except as regards the head. The proportion affected increased with the age up to 50, and later fell. In nodular cases 99 per cent. were affected, in macular cases 84 and in nerve cases only 71 per cent.

L. R.

STEIN (A. A.). **The Skin Temperature in Leprosy.**—*Internat. Jl. Leprosy.* Manila. 1934. Oct.–Dec. Vol. 2. No. 4. pp. 403–411. With 3 figs.

The author concludes from his study that the skin temperatures are usually higher in dermal leprosy owing to the vascularity of infected tissue, especially in young lesions and reacting ones. In neural leprosy the temperature may be higher over macules, but it is generally lower over other lesions, and the anaesthetic areas have a lower temperature. *L. R.*

FÉRON (J.). Lèpre et neuro-fibromatose. [**Leprosy and Neurofibromatosis.**]—*Bull. Soc. Path. Exot.* 1934. Dec. 12. Vol. 27. No. 10. pp. 912–915. With 2 figs.

This is a brief report of case of leprosy and Recklinghausen's neurofibroma being met with in the same subject. *L. R.*

FOX (Howard) & KNOTT (James). **Leprous Nodules of the Male Genitalia.** —*Internat. Jl. Leprosy.* Manila. 1934. Oct.–Dec. Vol. 2. No. 4. pp. 445–446. With 1 plate.

This is a brief illustrated account of an advanced nodular leprosy case with well-marked lesions on the penis and scrotum. *L. R.*

MOISER (B.). **Analysis of 722 Cases of Leprosy and their Treatment.** —*Internat. Jl. Leprosy.* Manila. 1934. Oct.–Dec. Vol. 2. No. 4. pp. 423–429.

This paper deals with 722 cases of leprosy treated in 1931–34 at the Ngomahuru Leper Hospital of Southern Rhodesia, all negroes except one, and including 80 children, all but one infected before admission. Conjugal infections were 6·6 per cent. Neural cases formed 45, cutaneous 2 and mixed 53 per cent. of the total. Regular occupation and exercise is provided by gardening, etc. Alepol and ethyl esters form the "specific treatment," chiefly the latter in the iodized form as it is less irritant, 10 cc. being injected once a week intramuscularly and intradermally, and with one or two weeks remission after seven weeks treatment. Trichloracetic acid is applied to nodules and raised macules. The results show among N1 cases 55 discharged arrested and 38 likely to be so soon, or 95 per cent. of good results. Of 106 N1–C1 cases 8 are discharged, 77 improved, and a total of 46 per cent. have become bacteriologically negative and most of them will probably be discharged in time. "So it can be said that over 90 per cent. of our early cases can be arrested—and called cured if we do not quibble about the word." Only 14 were purely cutaneous and 1 is discharged and 6 others improved. Improvement in some degree has been shown in all except the advanced N3–C3 type, which are few and their treatment is of doubtful value, but occasionally an apparently hopeless case shows remarkable improvement. Microscopical examinations are made four times a year and give the best indication regarding progress, for with improvement the bacilli become less deeply stained, scattered and dotted. The work is still deficient as regards following up discharges and examining contacts of known cases, which is a much better way of getting early cases than a general survey. *L. R.*

i. MONTEL (M. L. R.). Poussées de lépromes furonculoïdes au cours du traitement par le bleu de méthylène. [**Furunculosis in Methylene Blue Treatment.**]—*Bull. Soc. Méd.-Chirurg. Indochine.* 1935. Jan. Vol. 13. No. 1. pp. 9–12.

ii. DOROLLE (P.) & NGO-QUANG-LY. Lèpre mixte et polynévrite à marche aiguë. Traitement par le bleu de méthylène. Guérison rapide de la polynévrite. Arrêt et régression de l'évolution lépreuse.—*Ibid.* pp. 16–20.

i. Montel records that the methylene blue treatment in leprosy predisposes to the development of pustules and acne over the lesions,

but he does not consider this a contraindication unless prolonged and extensive, as he thinks it favours the resolution of the leprous lesions. The condition is favourably influenced by lugol intravenously or by eosinosate of caesium.

ii. This is a report on an advanced mixed case of leprosy showing great improvement in all respects under methylene blue treatment.

L. R.

DUBOIS (A.), WESTERLINCK (H.) & DEGOTTE (J.). Essais thérapeutiques dans la lèpre. Le bleu de méthylène. [**Methylene Blue in Leprosy.**]—*Bull. Soc. Path. Exot.* 1935. Feb. 13. Vol. 28. No. 2. pp. 63–67.

The treatment of 15 leprous negroes by Montel's methylene blue solution intravenously is reported on with totals of 3 to 6 gm. of the drug. The results were completely negative, and they suggest that possibly the photodynamic action of the drug deposited in the skin lesions may be inhibited by the pigment of black races, although against this they point out that RYRIE obtained negative results with this dye in the Orient. *L. R.*

LÉPINE (P.) & MARKIANOS (J.). Action directe du bleu de méthylène sur le bacille de Hansen dans l'organisme humain. [**Action of Methylene Blue on Hansen's Bacillus.**]—*C. R. Soc. Biol.* 1935. Vol. 118. No. 1. pp. 9–10.

In view of MONTEL's results from intravenous injections of methylene blue the authors have tested the action of the dye on lepra bacilli by puncturing leprous lesions after intravenous injections of the dye, and staining the bacilli and cells in the exudate by Ziehl's method. After the first injections no changes in the number of staining properties of the organisms were noted, but, even before the lesions showed obvious changes apart from the blue staining, some of the bacilli showed an irregular granular aspect, and later they stained blue, and not red, by the Ziehl method. These changes increased to indicate a direct action of the dye in producing progressive degeneration of the microbes.

L. R.

MARCHOUX (E.) & CHORINE (V.). Action du bleu de méthylène sur les lépromes "in vivo." [**Action of Methylene Blue on Lepromas.**]—*Bull. Acad. Méd.* 1935. Jan. 8. 99th Year. 3rd Ser. Vol. 113. No. 1. pp. 10–12.

The authors have investigated the action of methylene blue on lepromes by injecting intravenously rats infected seven months previously with rat leprosy, and sacrificing them for microscopical examinations after varying intervals. The stain is reduced in living cells to a colourless product, but the lepra bacilli retain the blue colour, which may serve to convey an active substance into them, although the dye itself is not lethal to the organisms. *L. R.*

NICOLAS (C.). Bleu de méthylène et lèpre. [**Methylene Blue and Leprosy.**]—*Bull. Soc. Path. Exot.* 1935. Jan. 9. Vol. 28. No. 1. pp. 10–11.

The author reports favourable results from intravenous injections of methylene blue, although it failed in cases in which such a chaulmoogra

preparation as hydranol had not proved successful. The dye treatment is less painful and more acceptable to the patients than hydranol.

L. R.

SICÉ (A.) & MOREAU (P.). De la surveillance de la fonction rénale au cours du traitement prolongé de certains lépreux par le bleu de méthylène. [**Renal Functions under Methylene Blue Treatment.**]—*Marseille-Méd.* 1934. Nov. 25. Vol. 71. No. 33. pp. 637–642.

The authors report that they have confirmed the good results of MONTEL from the methylene blue treatment of leprosy, but they record two cases in which after prolonged injections of the drug albuminuria was produced due to irritation of the kidney parenchyma during the excretion of the drug. *L. R.*

i. FRÉVILLE (L. H.). Note relative à quelques essais d'injections intraveineuses de solution iodo-iodurée dans la lèpre. Premiers résultats. [**Intravenous Injections of Potassium Teriodide in L.**]—*Bull. Soc. Méd.-Chirurg. Indochine.* 1934. Oct. Vol. 12. No. 8. pp. 756–758.

ii. MONTEL (M. L. R.). A propos de la communication de Fréville quelques essais d'injections intraveineuses de solution iodo-iodurée dans la lèpre.—*Ibid.* pp. 759–760.

i. After methylene blue injections suppuration of the crural glands accompanied by fever appeared, and was treated by intravenous injections of four doses of 4 to 10 cc. of I. 1 gm. KI. 2 gm. in 300 cc. distilled water, with the result that suppuration and fever subsided completely. In two other cases of febrile reactions similar good effects were obtained.

ii. Montel confirms the above, and adds that he treated another reacting case with injections of eosinate of caesium with success after three doses. *L. R.*

LAGROSA (M.), ALONSO (J. M.), TIONG (J. O.) & PARAS (A.). **Treatment of Acute Leprous Neuritis with Iodized Wightiana Ethyl Esters (with Report of Cases).**—*Jl. Philippine Islands Med. Assoc.* 1935. Feb. Vol. 15. No. 2. pp. 87–94.

Fourteen cases with thickened and inflammed nerves and great pain were treated by the injection along the course of the nerves, and sometimes into them, of from 1 to 4½ cc. of iodized ethyl esters, with rapid amelioration of the pain, frequently followed by improvement in sensation and contractures of the fingers. Four other cases injected with dilester from Fiji did not do so well. *L. R.*

MONSERRAT (Carlos). **Does Chaulmoogra Treatment influence the Shifting of Serologic Findings in Lepers as obtained by the Wassermann, Kahn, and Vernes Reactions ?**—*Philippine Jl. Sci.* 1934. July. Vol. 54. No. 3. pp. 343–363. With 6 figs.

The Wassermann, Kahn and Vernes reactions have been investigated before and after treatment in 84 lepers in all, 46 of whom had received no chaulmoogra injections. There was a general agreement of the three tests both before and after treatment, but the Wassermann reactions were weaker than the others. Reactions were more frequent

in those over 30 years of age, in those positive bacteriologically and in the mixed type. Prolonged chaulmoogra treatment may cause a marked decrease in the reactions, without necessarily improvement for a time, and neosalvarsan has a similar effect and is beneficial. Chaulmoogra oil may also reduce the reactions in monkeys infected with syphilis or yaws, and in both cases the Vernes reactions were changed more promptly than the others. 17·8 per cent. of the lepers gave plus reactions with all three tests. *L. R.*

STÉVENEL (L.). L'épuration des huiles de chaulmoogra n'est-elle pas une erreur thérapeutique? Réflexions au sujet des injections intraveineuses d'huile. [**Possible Disadvantage of refining Chaulmoogra Oil.**]—*Bull. Soc. Path. Exot.* 1935. Jan. 9. Vol. 28. No. 1. pp. 14–18.

The author suggests that the original chaulmoogra oils may be more active than preparations made from them on account of the former containing impurities such as sterol, which he thinks is more active than the oil, so the latter should be injected intravenously in a fine emulsion. [The reviewer sent to India for trial fine hydnocarpus emulsions, which were considered to be promising.] *L. R.*

EMERSON (George A.) & ANDERSON (Hamilton H.). **Acute Toxicity of Ethyl Chaulmoograte.**—*Proc. Soc. Experim. Biol. & Med.* 1934. Nov. Vol. 32. No. 2. pp. 289–291.

A study has been made in rats of the toxicity of single doses of a number of ethyl ester chaulmoograte preparations with the following results :—

" Examination of the tabulated data indicate that : (1) purified ethyl chaulmoograte preparations are more toxic than the ethyl esters of the total fatty acids of chaulmoogra oil, presumably because of higher content of ethyl chaulmoograte ; (2) iodizing ethyl chaulmoograte with 0·5 per cent. iodine has little effect on toxicity ; (3) addition of 4 per cent. creosote increases the toxicity, commensurate with the amount of creosote present ; (4) the degree of unsaturation of crude ethyl chaulmoograte is not a sufficiently sensitive index of toxicity to be reliable ; and (5) if subcutaneously administered ethyl chaulmoograte exerts its toxic effect through liberation of Na chaulmoograte into the circulation, the summation of rates of hydrolysis and diffusion cannot much exceed that causing a disappearance of 2 millimols per Mol of the injected ester per hour, since Na chaulmoograte kills rats in intravenous acute doses of 0·1–0·125 gm./kg." *L. R.*

COLE (H. I.). **Note on the Decomposition Products in Chaulmoogra Oils.**—*Internat. Jl. Leprosy.* Manila. 1935. Jan.–Mar. Vol. 3. No. 1. pp. 81–82.

In this brief note the author points out that in the course of his earlier work at Culion he often noted a syrupy oil as a by product in the analysis of chaulmoogra oils, a decomposition product formed more rapidly in the presence of light and air and under tropical conditions. Pure hydnocarpic acid was transformed much more rapidly than pure chaulmoogric acid.

L. R.

EMERSON (George A.), ANDERSON (Hamilton H.) & LEAKE (Chauncey D.). **A Pharmacological Comparison of Na-Hydnocarpate ("Alepol") and Na-Dichaulmoogryl-β-Glycerophosphate ("Chaulphosphate").**—Reprinted from *Arch. Internat. Pharmacodyn. et Thérapie.* 1934. Vol. 48. No. 2. pp. 247–254. [18 refs.]

The authors state that a water soluble chaulmoograte in the form of sodium gynocardate was first used for the general systemic treatment of leprosy by L. ROGERS, with desirable results by the intravenous method, but with the drawback of blocking the veins, which is only partly overcome by MUIR's technique; alepol is the best of such preparations. With a view to further improvement the synthesis of soluble chaulmoograte without the undesirable effects of soaps has been undertaken by Richard WRENSHALL in Hawaii, and they have been tested on rat leprosy in comparison with alepol. The best of these is sodium dichaulmoogryl-β-glycerophosphate, called for convenience "Chaulphosphate," as it has a low and reasonably constant toxicity in animals, especially intravenously; this is important because a definite correlation between available chaulmoogric acid and the beneficial effect in rat leprosy has been noted. Slow hydrolysis may have the same result as constant small injections of sodium chaulmoograte. The new preparation has a lower iodine number, is four to ten times less toxic than alepol, is not haemolytic, and highly unsaturated, and probably more active. Chaulmoogric acid is liberated from it. The use of this drug in rat leprosy compared favourably with alepol, and it has already been given to six volunteers intravenously in total amounts of 175 mgm./kgm. in two weeks in a 3⅓ per cent. solution. *L. R.*

DE SOUZA-ARAUJO (H. C.). **The Brazilian Chaulmoogra:** *Carpotroche brasiliensis.* **A Review.**—*Internat. Jl. Leprosy.* Manila. 1935. Jan.–Mar. Vol. 3. No. 1. pp. 49–66. With 15 figs. on 6 plates. [37 refs.]

A botanical description of *Carpotroche brasiliensis* is first given, and the geographical distribution and mode of culture described. Recorded chemical analyses of the Sapucainha oil derived from the seed are discussed, and its commercial products enumerated. Special fatty acids have been described by MACHADO under the terms carpotrochic and carpotrochinic acids, but DA SILVA found only chaulmoogric and hydnocarpic acids as in other chaulmoogra oils. *L. R.*

MONTEL (M.) & TRUONG-VAN-QUE. Essais de traitement de la lèpre par les injections intraveineuses de résorcine. [**Treatment of Leprosy by Intravenous Injections of Resorcin.**]—*Bull. Soc. Path. Exot.* 1935. Mar. 13. Vol. 28. No. 3. pp. 167–169.

Intravenous injections of resorcin, 40 cgm. up to 1·15 gm., in lepers had no toxic effect and appeared to improve the general health of the patients, except in one cachectic case in which albuminuria ensued. In four nodular cases no benefit resulted, and in three early cases only slight temporary reduction in the infiltration of the lesions was noted, so a more active treatment had to be adopted. *L. R.*

TISSEUIL (J.). Traitement de la lèpre par injections intraveineuses d'eau distillée. [**Treatment of Leprosy by Intravenous Injections of Distilled Water.**]—*Bull. Soc. Path. Exot.* 1935. Mar. 13. Vol. 28. No. 3. pp. 169–171.

The author reports two cases in which intravenous injections of distilled water apparently had a beneficial effect, especially as regards a feeling of well being and on sensory symptoms. *L. R.*

LOEWENSTEIN (E.). **The Cultivation of the Leprosy Bacillus. Preliminary Communication.**—*Internat. Jl. Leprosy.* Manila. 1935. Jan.–Mar. Vol. 3. No. 1. pp. 43–47.

Many years' work on the cultivation of the leprosy bacillus has convinced the author that the presence of saprophytic diphtheroids and other organisms in symbiosis with that of leprosy make such tissues unfavourable for obtaining pure cultures of the latter, so he has attempted to do so from the blood of lepers. It should be citrated and dehaemoglobinized by the addition of sterile distilled water and centrifuged three times. The deposit is then treated with 1 cc. of 15 per cent. sulphuric acid for five minutes and again washed twice, and glycerine egg and other media to which fish broth has been added inoculated. In two out of five cases a pure culture of acid-fast bacilli, and in two both tubercle and leprosy bacilli were obtained. The growth is so slow that it takes up to six months to get visible colonies. They produced acid and were not infective to guinea-pigs. *L. R.*

LOWE (John). **A Note on the Application of Tissue Culture Methods to Leprosy Research.**—*Leprosy in India.* 1935. Jan. Vol. 7. No. 1. pp. 19–22.

This is a brief review of former work on attempts to grow the lepra bacillus in tissue cultures by SALLE, TIMOFEJEWSKY and by MCKINLEY and VERDER. Lowe reports that he has failed to confirm the work of the last two, but thinks further trials are required. *L. R.*

DUVAL (Charles W.). **Morphological and Tinctorial Behavior of *B. leprae* during its Adaptation to an *in Vitro* Habitat.**—*Proc. Soc. Experim. Biol. & Med.* 1934. Dec. Vol. 32. No. 3. pp. 498–503.

In view of very varying morphology attributed to the *M. leprae* in cultures the author has studied its changes in *in vitro* tissue cultures of leprous material by staining portions in different ways at various intervals of time in the course of six months' culture. The globi first disappear and the bacilli become more rounded at the ends. The granules or beads may be seen at either pole producing a diphtheroid appearance, while others have 4 to 6 granules. Free granules may be seen at times, but not after the bacilli gain the power of saprophytic growth. The acid-fast characters are retained throughout and they are positive to Gram's stain. Loeffler's methylene blue shows the intra- and extracellular granules to be metachromatic.

L. R.

POOMAN (A.). Die McClure-Aldrich-Quaddelprobe bei Leprösen. [**The McClure-Aldrich Wheal Test in Leprosy.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1935. Mar. Vol. 39. No. 3. pp. 121–123. [10 refs.]

The author reports on trials of the McClure-Aldrich intradermal wheal test (Q.R.Z.) in 14 cases of leprosy, one of whom was a recovered patient. Two cc. of physiological salt solution is injected intradermally, and also Q.R.Z. antigen. In healthy persons absorption takes 60 to 90 minutes, or in the author's controls an average of 58 minutes. In 7 nodular lepers the time was from 17 to 39 minutes, in 4 maculo-anaesthetic cases 25 to 48 minutes, in 1 mixed case 27 minutes and in 1 tuberculoid case 17 minutes. *L. R.*

HOFFMANN (W. H.) & BAEZ (Pedro Ramos). **Allergic Erythematous Eruptions in Leprosy.**—*Internat. Jl. Leprosy.* Manila. 1935. Jan.–Mar. Vol. 3. No. 1. pp. 23–32. With 2 figs. on 1 plate.

This is a brief report of two cases showing Herxheimer's reaction. It is followed by a theoretical discussion in which the authors assume the occurrence of a pre-bacillary period, which may produce sufficient toxin to create a state of sensitivity, and this may later give rise to an allergic reaction when a large number of bacilli are destroyed and their toxins liberated, to produce a congestive and anaphylactic eruption. *L. R.*

PARMAKSON (Paul). Ueber die eosinophilen Zellen im Blutbilde der Leprakranken. [**The Eosinophiles in Leprosy.**]—*Dermat. Woch.* 1935. Mar. 9. Vol. 100. No. 10. pp. 285–288. [13 refs.]

From the examination of the blood of 24 lepers the author concludes that eosinophilia is not characteristic of leprosy, for in active untreated cases he found a fall in the number of eosinophiles, and normal counts or a slight increase in latent cases. The fluctuation in their numbers is determined by variations in other infections of the patients. Successful treatment is followed by some increase. *L. R.*

OTA (Masao) & ISHIBASHI (Takeo). **Complement-Fixation Reaction of Lepers' Sera with Bacillary Antigens.**—*Internat. Jl. Leprosy.* Manila. 1934. Oct.–Dec. Vol. 2. No. 4. pp. 413–422.

The authors' complement-fixation tests agree with those of others in showing that different strains of acid-fast bacilli cannot be distinguished by their means. On the other hand, they found that Ota and Sato's Bg strain in particular gave a very high percentage of positives with leper's sera, and almost negligible ones with non-leprous sera. Illustrative tables are given and the technique is described. They think that with the isolation of the chemical elements of the bacteria it may become possible to differentiate the bacilli also, and they believe the ether-soluble elements are most concerned in such specificity. *L. R.*

BULKIN (A.). **The Complement Fixation with Leprous Antigens in Leprosy.**—*Med. Parasit. & Parasitic Dis.* Moscow. 1935. Vol. 4. No. 1–2. [In Russian pp. 36–38. English summary p. 38.]

The author describes the results of the complement fixation test with 101 samples of serum (84 from cases of leprosy and 17 from non-leprous ones, including 3 cases of syphilis and 1 of tuberculosis). Bacterial, testicular and complex (bacterial + testicular) antigens were employed. The highest percentage of positive results was obtained with the bacterial antigen, the lowest with testicular, while the tests with all the non-leprous sera were negative. *C. A. Hoare.*

MILASCH (G. P.). Ueber die Veränderung des elastischen Gewebes bei Lepra. [**Changes in Elastic Tissue in Leprosy.**]—*Virchows Arch. f. Path. Anat. u. Physiol.* 1934. Vol. 292. No. 2. pp. 216–219. With 1 fig.

This is a brief paper describing and illustrating the disintegration of the elastic fibres in the skin of a proliferating leprome. *L. R.*

BLACK (Sam H.) & ROSS (Hilary). **Blood Cholesterol in Leprosy. A Study of the Total and Free Cholesterol, Cholesterol Esters, Van den Bergh Reaction, and the Complement Fixation Test.**—*Public Health Rep.* 1935. Jan. 11. Vol. 50. No. 2. pp. 50–59. [15 refs.]

The blood of 200 lepers and of 20 healthy young adults was examined for total and free cholesterol, cholesterol esters and the percentage of esters, and the sera used for the van den Bergh reaction and the complement fixation test. The esters were higher in lepers and highest in those retrograding. Serum bilirubin was positive in 138 cases. There was no correlation between complement fixation and the cholesterol. *L. R.*

RODRIGUES DE ALBUQUERQUE (A. F.). Sur l'isolement d'un bacille acido-résistant d'un léprome. [**Isolation of Acido-Resistant Bacillus from a Leprome.**]—*C. R. Soc. Biol.* 1935. Vol. 118. No. 7. pp. 713–715.

Cultures were made from two leprosy nodules removed from a patient, titrated in a sterile manner with salt solution and inseminated on glycerine jelly and broth, Petroff's and Petragnani's media. On the last after eight days whitish yellow colonies of an acid-fast bacillus were obtained which retained their characters to the third subculture. *L. R.*

GILLIER (M. R.). Une méthode sérique simple différenciant la lèpre et la syphilis (note préliminaire). [**Differentiation of Leprosy and Syphilis Serologically.**]—*Bull. Soc. Path. Exot.* 1934. Dec. 12. Vol. 27. No. 10. pp. 915–917.

By the formol-gel and the reaction of Meinicke leprosy and syphilis give similar reactions except that tolu-antigen gives a positive result with syphilitic and a negative one with leprous sera. *L. R.*

i. BERNY (P.). La bacillurie chez les rats lépreux. [**Rat Leprosy.**]—*Bull. Soc. Path. Exot.* 1934. Dec. 12. Vol. 27. No. 10. pp. 910–912.
ii. PRUDHOMME (R.). Action des rayons X sur les lépromes des rats.—*Ibid.* pp. 917–920.
iii. BERNY (P.). Conservation de la vitalité du bacille de Stéfansky chez le cobaye.—*Ibid.* 1935. Jan. 9. Vol. 28. No. 1. pp. 5–7.
iv. PRUDHOMME (R.). Influence du pH sur la conservation du bacille de Stefanski en bouillon glycériné.—*Ibid.* pp. 11–14.
v. THIROUX (A.). Essais de chimiothérapie de la lèpre du rat.—*Ibid.* pp. 18–21.

i. The first of this series of short papers on rat leprosy records observations of Berny to show that bacilluria does not normally occur in the disease, but it may be induced by administering novarsenobenzol, but not by potassium iodide.

ii. Prudhomme reports that radiation at the site of inoculation of rat leprosy bacilli does not prevent infection, although it retards its evolution. Cells parasitized by the organism are more rapidly destroyed by X-rays than normal cells, but bacilli set free by destroying the cells retain their vitality for at least ten days.

iii. Berny has investigated the period of survival of Stefansky's bacillus when injected into guineapigs, which are immune to infection, and found that they remained infective for rats up to 39 days, but died between 39 and 45 days.

iv. Prudhomme has tested the influence of pH on the survival of Stefansky's bacillus in glycerine broth, and concludes that it only flourishes in a pH between 6 and 7, with an optimum of 6·4.

v. Thiroux reports on the treatment of leprous rats, with controls, by injections of some new chemotherapeutic preparations of nickel, cobalt and arsenic supplied by Professor FOURNEAU and M. TRÉFOUEL. Only temporary retardation of the development of the leprous lesions was noted, especially after the use of nickel, and the subsequent evolution of the disease was as complete as in the controls. *L. R.*

BERNY (P.). Un séjour de 24 h. *in vitro* dans le bleu de méthylène à 0,5 p.o/o n'atténue pas la virulence du bacille de Stéfansky. [**Attempted Attenuation of Stefansky's Bacillus by Methylene Blue.**]—*Bull. Soc. Path. Exot.* 1935. Feb. 13. Vol. 28. No. 2. pp. 58–59.

The action of methylene blue *in vitro* on the rat leprosy bacillus has been tested by making a bacillary emulsion from an intraperitoneal leprome removed from an infected rat, and mixing with an equal volume of a 1 per cent. solution of the dye. After keeping at blood heat for 12 to 24 hours the emulsion was injected into six rats, only two of which survived the dose, and he found months later both had developed rat leprosy ; so the strong solution of the dye had no effect in attenuating the organism. *L. R.*

LAMB (Alvin R.). **The Effect of Malnutrition on the Pathogenesis of Rat Leprosy.**—*Amer. Jl. Hyg.* 1935. Mar. Vol. 21. No. 2. pp. 438–455. With 6 figs.

The author points out that there is some general relationship between diet deficiencies, especially such as produce beriberi, and the

distribution of leprosy; this has led him to study the question experimentally in rats inoculated with material from rat lepromata, either subcutaneously or intra-cardially, on normal and on deficient diets. The subcutaneous inoculations of rats on diets of varying deficiencies generally yielded negative results, but after intracardiac inoculation rats on diets deficient in vitamin B complex, and with somewhat low protein, showed extensive increase in the lepromatous lesions in the liver more particularly as compared with the controls, and to a less extent with regard to the spleen, lungs and lymph nodes. Similar changes were found in fourth generation rats on a diet less deficient in vitamin B. *L. R.*

CHOUCROUN (Nine) & PELTIER (Maurice). Sur l'ultravirus de la lèpre murine. [**The Ultravirus of Rat Leprosy.**]—*C. R. Acad. Sci.* 1935. Feb. 25. Vol. 200. No. 9. pp. 785–787.

The question of the occurrence of an ultravirus filterable stage of the organism has been reinvestigated to determine if any visible bacilli are present in the filtered material which gave rise to rat leprosy on inoculation into those animals. Chamberland bougies L2 and L3 were used, and the filtrates were subject to a 40 volt-cm current for an hour and a half, and then the fluid on the anode poles, which attract any particles, was examined minutely, with the result that in four of six experiments a small number of bacilli were demonstrated. This indicates that a few of Stefansky's bacilli had passed through the filters and explained infection of rats by such filtrates, and not by the ultravirus of Markianos. *L. R.*

AFANADOR (A.). Evolution de la formule leucocytaire chez le rat lépreux. [**The Leucocyte Formula in the Leprous Rat.**]—*Bull. Soc. Path. Exot.* 1935. Feb. 13. Vol. 28. No. 2. pp. 67–70.

Healthy rats show a high proportion of lymphocytes, but in rat leprosy with the development of the disease they tend to be replaced by polynuclears and large mononuclears, especially when suppuration takes place. *L. R.*

BOURGUIGNON (G. C.). Nouveau cas de lèpre diagnostique au Congo Belge chez un Européen.—*Ann. Soc. Belge de Méd. Trop.* 1934. Dec. 31. Vol. 14. No. 4. pp. 389–392. With 2 figs.

BURKITT (R. W.). Case of Leprosy treated by Intravenous Injections of Methylene Blue.—*East African Med. Jl.* 1935. Feb. Vol. 11. No. 11. pp. 356–358.

CHATTERJI (S. N.). The Age of Danger for Leprosy.—*Internat. Jl. Leprosy.* Manila. 1935. Jan.–Mar. Vol. 3. No. 1. pp. 82–83.

DOROLLE & NGO-QUANG-LY. Essai d'emploi dans le traitement de la lèpre d'un colorant composé: bleu de méthylène-éosine.—*Bull. Soc. Méd.-Chirurg. Indochine.* 1935. Jan. Vol. 13. No. 1. pp. 21–24.

DUTTA (Nirmal Chandra). An Encouraging Result obtained by the Use of E.C.C.O. in the Early Stage of Leprosy—Anaesthetic Type.—*Indian Med. Gaz.* 1934. Dec. Vol. 69. No. 12. pp. 688–689.

FENG (C. T.) & CHENG (C. L.). A Preliminary Report on the Use of Benzylephedrine-Chaulmoogra Oil in the Treatment of Leprosy.—*Far Eastern Assoc. Trop. Med. Trans. Ninth Congress, Nanking, China, 1934.* Vol. 1. pp. 741–747. With 14 figs. on 5 plates & 1 text fig.

HOFFMANN (W. H.) & RAMOS BAEZ (Pedro). Los brotes fluxionarios de la algeria en la lepra.—Reprinted from *Jl. d. Clinicos.* 1934. July 15. No. 13. 28 pp. With 2 figs.

HUIZENGA (Lee S.). Anhydrosis and Alopecia in Leprosy. A Report on Two Hundred Cases.—*Far Eastern Assoc. Trop. Med. Trans. Ninth Congress, Nanking, China, 1934.* Vol. 1. pp. 715–720.

LOWE (John). A Note on the Staining of *Mycobacterium leprae* in Tissue Sections.—*Indian Jl. Med. Res.* 1934. Oct. Vol. 22. No. 2. pp. 313–315.

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MONTEL (M. L. R.) & NGUYEN-NGOC-NHUAN. Un cas de lèpre trophoneurotique et maculeuse traité par les injections intraveineuses de bleu de méthylène. Bilan après 8 mois de traitement.—*Bull. Soc. Méd.-Chirurg. Indochine.* 1934. Nov. Vol. 12. No. 9. pp. 812–823.

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RIBEIRO (Leonidio). La lèpre est capable d'altérer les dessins papillaires des empreintes digitales.—*Bull. Acad. Méd.* 1934. Dec. 18. 98th Year. 3rd Ser. Vol. 112. No. 41. pp. 821–822.

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WALKER (Ernest Linwood) & SWEENEY (Marion A.). Cultivation of Facultative Acid-Fast Bacteria from Filtrates of Leprosy.—*Proc. Soc. Experim. Biol. & Med.* 1934. June. Vol. 31. No. 9. pp. 1162–1163.

THE TYPHUS GROUP OF FEVERS.

RIDING (D.). **The Typhus Group of Fevers.**—*Jl. Egyptian Med. Assoc.* 1935. Mar. Vol. 18. No. 3. pp. 147–161. [10 refs.]

The first part of this paper consists of a brief summary of present day knowledge of the typhus group of fevers. An up-to-date and comprehensive table is given.

In the early months of 1933 a large number of cases of typhus occurred in Egypt. Blood was taken from a typical case on the 6th day of fever and injected into two guineapigs; both developed fever after an incubation period of 13 days. The virus was passaged to other guineapigs. In no case was the Neill-Mooser reaction noted in any of the infected guineapigs. Rabbits inoculated intraperitoneally with brain emulsion of infected guineapigs developed agglutinins for OX19 to a titre of 1/250. Inapparent infections were produced in rats. The virus was the "classical old world epidemic typhus."

One hundred and thirty wild rats and mice were captured in Cairo and examined but no strain of typhus virus could be isolated from them.

An interesting Haemophilus bacillus resembling Rickettsia was isolated from some of the wild rats and is described. *D. Harvey.*

JOURNAL OF THE ROYAL ARMY MEDICAL CORPS. 1935. Mar. Vol. 64. No. 3. p. 187.—**The Typhus Group of Fevers.**

The classification as displayed in attached table and based on the serological reactions of the typhus fevers is suggested by FELIX as preferable to classification according to the vectors. [In this table São Paulo typhus is shown as "undetermined" but the sera of cases of this disease have been shown to agglutinate X19 in high dilution and XL (Lima) in a similar manner.]

Typhus Group of Fevers.

Subgroup	Type X19	Type XK	Type undetermined
Name of disease	*Classical epidemic typhus* Tabardillo endemic typhus (Brill's) of U.S.A. and Australia, Greece, Syria, Manchuria, Malaya (shop typhus) and Toulon (fièvre nautique)	*Japanese river fever* (Tsutsugamushi fever of Japan, Malaya and Dutch East Indies) Malay scrub typhus, Scrub typhus of East Indies	*Spotted fever of Rocky Mountains* São Paulo endemic typhus, Fièvre boutonneuse, Febbre errutiva, Tick bite fever of S. Africa, India tick typhus
Vector	Lice and rat fleas	Mites	Ticks
Reservoir of virus	Rats Man	Field mice and rats	Rodents Dogs ? Ticks
Agglutination	X19+++ X2 + XK −	X19− X2 − XK +++	X19+ X2 + XK +

D. H.

JAME (L.) & AUJALEU (E.). Les fièvres typho-exanthématiques ou rickettsioses. [**The Typhus Fevers or Rickettsiases.**]—*Arch. Méd. et Pharm. Milit.* 1935. Mar. Vol. 102. No. 3. pp. 445–498. [154 refs.]

This able paper consists of a full review of the subject of the typhus fevers. Historic typhus, Brill's disease (endemic typhus), boutonneuse fever, Rocky Mountain fever, Japanese River fever and tropical typhus are all reviewed from the clinical and epidemiological aspects and the different types are contrasted and compared.

The one main common feature in all is the presence of Rickettsia. The Weil-Felix reaction is also referred to and a bibliography of over 150 periodicals is appended. *D. H.*

RONSE (Marguerite). Contribution à l'étude du typhus exanthématique. [**Contribution to the Study of Typhus.**]—*Ann. Inst. Pasteur.* 1935. Mar. Vol. 54. No. 3. pp. 341–382. With 7 figs. [47 refs.]

The conclusions of this comprehensive paper are to this effect :—

1. The virus of endemic typhus can infect other rodents besides rats, notably the grey mouse, dwarf mouse, field mouse and the dormouse ; of these the field mouse and the dwarf mouse were most susceptible.
2. Besides rodents, hedgehogs and pigeons were also infected with the virus.
3. In addition to infection by the bite of ectoparasites, rodents can be infected by the digestive route either by feeding on infected parasites or by devouring the carcases of animals which have died of the disease ; as a rule the disease acquired in this manner is less severe than that following injection of the virus or the bite of ectoparasites.
4. The Weil-Felix reaction was found to be positive in rats, mice and pigeons.
5. The author found that it was not possible to cultivate the virus in conjunction with moulds or fungi as SILBER had suggested.
6. Acting on the resemblance between Rickettsia and Bartonella a drug Solganal B, which has been found useful in the treatment of Carrion's disease, was given a trial on animals infected with typhus but with little or no effect on the course of the fever. *D. H.*

NICOLLE (Charles) & GIROUD (Paul). Non-transmission au rat, par ingestion, du virus typhique historique contenu dans des poux infectés. [**Rat not infected by Ingestion of Lice containing Historic Typhus Virus.**]—*C. R. Acad. Sci.* 1934. Nov. 26. Vol. 199. No. 22. pp. 1169–1170.

Some research workers have suggested that the rat virus of typhus when carried to man by the rat flea may become a human virus and be passed from man to man by the louse ; if this be so Nicolle enquires "How is the human virus re-transferred to the rat." One method might be by the rat swallowing infected lice and becoming infected through intestinal absorption, in the same way that rats become readily infected by eating rat fleas infected with the murine virus.

The authors carried out a series of experiments by feeding lice on typhus patients and subsequently feeding these infected lice to rats ;

none of the rats became infected; another proof of the difference between the murine and human virus. *D. H.*

NICOLLE (Charles) & GIROUD (Paul). Etude des rapports du typhus exanthématique historique et du typhus murin en Tunisie. Résultats d'une enquête sur l'existence du virus murin chez les rats de foyers de typhus historique invétérés et étients ou en activité. [**Relations of Historic and Murine Typhus in Tunis.**]—*Arch. Inst. Pasteur de Tunis.* 1935. Jan. Vol. 24. No. 1. pp. 8–28.

The authors have shown that the virus of endemic typhus can be readily isolated from the rats in Tunis; 4 per cent. of rats examined gave a positive Weil-Felix reaction. In spite of the presence of the murine virus especially in the dock rats there have been no outbreaks of louse-borne typhus in the city for the last 23 years; this is due in the opinion of the authors to the careful lousing of people (nomads) entering the city from the interior. A few cases of endemic typhus have been noted but no spread of the disease although there are people in the city who are infested with lice. It is argued that these facts are further proof that the murine virus does not give rise to epidemics of louse borne typhus.

Further investigations were undertaken in places in the country where typhus had been epidemic but had not been reported for a good many years. Such places were the two convict prisons of Porto-Farina and Djouggar. The rats met with there were *Mus alexandrinus* whereas in Tunis the common rat is *M. decumanus*. One hundred rats were examined in the old fort but none gave a positive Weil-Felix reaction and no typhus virus could be isolated; the same result was obtained at Djouggar. Investigations were then carried out among populations where louse borne typhus fever occurs every year, that is among the nomadic tribes in the desert country and mountain regions. Some 200 rats and mice caught in these areas were examined but in none was any evidence obtained of the presence of a true typhus virus. We have therefore the following contrast:—In Tunis, rats infected with typhus virus but no cases of true typhus. In the country, numerous cases of true typhus among the nomadic people but no evidence of typhus infection among the rat population. *D. H.*

NICOLLE (Charles) & GIROUD (Paul). Recherche des cas inapparents dans les foyers typhiques épars et mobiles du bled tunisien en 1934. [**Search for Cases of Inapparent Typhus among the Nomads in the Country round Tunis.**]—*Arch. Inst. Pasteur de Tunis.* 1935. Jan. Vol. 24. No. 1. pp. 29–46.

Three methods were employed in this research: (1) The Weil-Felix reaction; (2) Inoculation of the blood of people who gave a positive reaction into guineapigs (10 cases); (3) feeding of lice on the same people and search for the virus in these lice.

The results of the Weil-Felix reaction are given in detail for each village or camp. Of 170 people examined 38 gave a positive reaction. 30 up to a dilution of 1/50, 6 to 1/100 and 2 to 1/200. None of these people had had any fever recently and therefore eight of them may be said to be inapparent cases of typhus. The blood of 10 people was injected into guineapigs but none reacted; lice fed on three of these gave

also negative results, no Rickettsia were seen and injection of emulsion of the lice into guineapigs was negative. *D. H.*

NICOLLE (Charles) & GIROUD (Paul). Faits expérimentaux contraires à l'hypothèse de la transformation naturelle actuelle du virus typhique murin en virus historique, donc à l'unité actuelle de ces virus. [**Experimental Observations opposed to the Hypothesis of Transformation in Nature of Murine into Historic Virus.**]—*Arch. Inst. Pasteur de Tunis.* 1935. Jan. Vol. 24. No. 1. pp. 47–55.

The authors agree that the two typhus viruses, human and rat, have a common origin and that the rat virus is the older of the two. But they do not consider that at the present time it is possible to change the one virus into the other in the laboratory or that this process goes on, as some people think, from time to time naturally. Other workers have announced that they have succeeded in changing the rat virus into the human and *vice versa*, but Nicolle points out that this so-called change has been carried out in the guineapig, an animal which has no place at all in the story of typhus in nature, however useful it may be as an experimental indicator of infection in the laboratory. The guineapig is " un intrus " in the typhus story, an interloper.

It is true that a rat virus may lose its power of producing scrotal reaction in the guineapig and that a human virus may acquire it, but that only concerns the guineapig and does not change the human virus into the rat virus or *vice versa.*

If the rat virus can be changed into the human virus then it should be readily taken up by lice and the human virus by fleas. Experiments were carried out with this in view.

Lice were fed on monkeys which were infected with the rat virus of Tunis but none became infected. Fleas were then fed on guineapigs which were infected with the virus of human typhus but none became infected. Also rats were fed on lice which had been fed on typhus patients and contained Rickettsia but again none of the rats showed any sign of infection inapparent or otherwise.

These negative results, as the authors say, are certainly not in favour of the argument that the human virus can be changed readily into the rat virus or the rat virus into the human, and suggest that the two viruses are not identical. *D. H.*

CIUCA (M.), BALTEANU (J.) & CONSTANTINESCU (N.). Contrôle expérimental de la forme inapparente du typhus exanthématique chez l'homme. [**Experimental Control of the Inapparent Form of Typhus.**]—*C. R. Soc. Biol.* 1934. Vol. 117. No. 31. pp. 514–516.

An outbreak of typhus occurred in a hostel in which 20 young people were in close association ; 6 cases were reported ; the other 14 inmates showed no sign nor symptom of illness but the sera of all gave a positive Weil-Felix reaction at 1/100 to 1/300 dilution. 3 cc. of blood was taken from each person and inoculated intraperitoneally into guineapigs ; in two instances a typical typhus reaction was obtained.

An emulsion was made from the brain of one of these infected animals and injected into a chronic nerve patient ; no reaction

followed but guineapigs were infected from the blood of this man and the strain of virus was passaged to other guineapigs and to rats. These animals after the fever were shown to be immune to a second injection of the virus. *D. H.*

NICOLLE (Charles) & SPARROW (Hélène). Sur la signification des réactions scrotales observées chez les cobayes inoculés avec les virus typhiques. [**On the Significance of the Scrotal Reactions observed in Guineapigs inoculated with the Typhus Viruses.**]—*Arch. Inst. Pasteur de Tunis.* 1935. Jan. Vol. 24. No. 1. pp. 65–69.

The authors again point out that the typhus viruses are not the only agents which may cause orchitis in guineapigs. The glanders bacillus is of course well known in this respect but should rarely be confused with typhus. On the other hand infections with bacilli allied to paratyphoid B are common in guineapigs and also in wild rats and give rise to a condition which resembles closely the scrotal reaction produced by typhus virus. The authors insist that in typhus research no scrotal reaction should be accepted as positive until cultural experiments have shown that there is no bacillary infection ; the neglect of this precaution in the past has given rise to errors. Another agent which produces a scrotal reaction in guineapigs that has already been mistaken for the typhus reaction is the spirochaete of sodoku or rat-bite fever ; wild rats in some districts are heavily infected with this parasite and it is readily inoculated into guineapigs. The reaction, however, is more severe and prolonged than that of typhus and smears should reveal the presence of the parasite. *D. H.*

NICOLLE (Charles). A propos de six cas de typhus murin contractés au cours de recherches. [**Six Cases of Murine Typhus contracted in the Course of Research.**]—*Arch. Inst. Pasteur de Tunis.* 1935. Jan. Vol. 24. No. 1. pp. 99–113. With 8 charts.

The paper opens with some general remarks on the risks run by investigators generally in research laboratories, risks which are not fully appreciated by the public who benefit by these researches.

It is noted that since 1909, in spite of the fact that a great deal of work has been done in the author's laboratory at Tunis on louse-borne typhus, only one case of laboratory infection has occurred ; but in the short period since 1931 in which flea borne typhus has been investigated six cases have occurred. It is comparatively easy to avoid infection by lice in a well run laboratory but at certain seasons of the year in Tunis there is such a rapid multiplication of fleas on the experimental animals and on captured wild rats in the laboratory that it is difficult to avoid infection spreading among the animals and to the personnel. Two measures of prevention are suggested. (1) destruction of ectoparasites of the animals ; (2) protection of personnel by means of a special vaccine. Full notes and temperature charts are given of the six cases. *D. H.*

MEDULLA (Candido). Le malattie del gruppo tifo esantematico che si osservano in Cirenaica. [**The Typhus Group of Fevers seen in Cyrenaica.**]—*Arch. Ital. Sci. Med. Colon.* 1935. Jan. 1. Vol. 16. No. 1. pp. 7–39. With 22 figs. (1 map). English summary (2 lines.)

The author analyses 49 cases of typhus fever observed during 14 years, 1921–34. He divides them on clinical grounds into four types, according to the duration of the fever, the character and extent of the rash, the involvement of the nerve centres, and the Weil-Felix reaction.

Type 1 corresponds, says the author, with the common Mediterranean form, type 2 with boutonneuse fever, type 3 with mild endemic exanthematic typhus, and type 4 with the classic exanthematic typhus. Twenty-six of the cases were of the first type, a comparatively mild form, with fever for 10–11 days, no cerebral involvement, and absent Weil-Felix reaction ; there were five of the second type and nine in each of the other two. In the first ten years 19 cases were seen, all in the second half of the year, most in September–November, and nearly all were of types 1 and 2 ; from 1931–34, types 3 and 4 predominated and cases occurred in every month of the year except July, most in May. The article is illustrated with charts of cases and with a map showing the distribution in Cyrenaica. *H. H. S.*

RHODES (W. F.). **Typhus-like Fevers in the Union of South Africa.**—*South African Med. Jl.* 1934. Nov. 10. Vol. 8. No. 21. pp. 797–799.

The author refers to the three types of typhus which are known to occur in South Africa :—

1. *Epidemic type.*—This may be very severe and fatal in the native population, occurs in the winter and is louse-borne. The Weil-Felix reaction is positive, in some cases in high dilution up to 1/20,000.

2. *Tick bite fever.*—Tick-borne with primary sore and adenitis. Weil-Felix reaction positive but not noted till about 4th week, *i.e.*, in convalescence. XK also agglutinated.

3. *Endemic type.*—Occurs in the summer, not due to lice, probably due to rat flea. Weil-Felix reaction noted as early as 6th day and up to a dilution of 1/4,000. *D. H.*

PIJPER (Adrianus) & DAU (Helen). **South African Typhus.**—*Jl. Hygiene.* 1935. Feb. Vol. 35. No. 1. pp. 116–124. With 2 figs. [29 refs.]

In 1933–34 some 40 cases of sporadic or endemic typhus occurred in Pretoria and were investigated by the authors. The majority of the cases were mild but one or two patients were severely ill with all the symptoms of classical typhus. There was no evidence of contact infection and lice and ticks could be definitely excluded as vectors of the disease.

The Weil-Felix reaction was carried out in 30 cases, OX19, OX2 and OXK emulsions being employed ; all 3 varieties were agglutinated but in varying degree. The most interesting feature of the results was that X19 and X2 were on the whole agglutinated in higher dilution than OXK and OX2 reacted at least as well as OX19.

Five cc. of blood taken from a patient at the height of fever was inoculated intraperitoneally into a guineapig and fever followed ; this virus was passaged in guineapigs ; occasional swelling of the testicles was noted and other symptoms of typhus infection. This virus was compared and contrasted with the viruses of tick bite fever and louse borne typhus fever.

The new Pretoria virus immunizes against itself and against the virus of tick bite fever but not against the virus of louse borne typhus (S.A.). Also the virus of tick bite fever did not immunize against the Pretoria virus whereas the virus of louse borne virus did protect against the new virus. The virus isolated from these cases of sporadic typhus was compared with a virus previously isolated from rats in Potchefstroom and the conclusion is that they are identical. 17 sera of cases of louse borne typhus were tested against the 3 varieties of Proteus X19, X2 and XK. Although the reactions were somewhat indefinite yet all 3 varieties were agglutinated and again X2 in as high dilution as X19, contrary to what usually occurs in European classical typhus. *D. H.*

SEREFETTIN (O.). La fièvre exanthématique murine à Istanbul. [**Murine Typhus at Istanbul.**]—*Bull. Soc. Path. Exot.* 1934. Nov. 14. Vol. 27. No. 9. pp. 831–833.

Severe epidemics of true typhus occurred in Turkey during the war and this disease is still met with. Recently cases of boutonneuse fever have been described ; and in the present paper the writer records the first two cases of endemic or murine typhus in the country. The clinical symptoms were typical of this disease and the Weil-Felix reaction was positive for X19 in both cases. Guineapigs inoculated with the blood of one of the cases reacted with fever and typical orchitis.

Turkey may now be added to the countries where flea-borne typhus occurs. *D. H.*

RAGIOT (Ch.) & DELBOVE (P.). Typhus endémique bénin en Cochinchine. [**Endemic Typhus in Cochin-China.**]—*Bull. Soc. Path. Exot.* 1934. Nov. 14. Vol. 27. No. 9. pp. 881–889.

In 1908 typhus fever (classical) was described by YERSIN in Indo-China and in 1921 an epidemic of this disease occurred in Hanoi. One case of tsutsugamushi disease has recently been fully reported, and in this paper several cases of endemic typhus are described. The clinical features were as usual except for the fact that bronchopneumonia was present as a complication in most of the cases (see SACHS, below). There were no deaths.

The Weil-Felix reaction in two of the cases was as follows :—

X19 (Metz)	X19 (Syria)	XK
1/500	1/500	1/300
1/500	1/500	Nil.

All 3 varieties of Proteus X were agglutinated but X19 in higher dilution than XK. No primary sore was ever detected. *D. H.*

OZAKI (Y.) & OHTSUKA (I.). **Epidemiological Observation on the So-called "Manchuria Fever" in the City of Hsinking, Manchoukuo, in 1933.**—*Jl. Oriental Med.* 1935. Feb. Vol. 22. No. 2. [In Japanese pp. 319–332. With 2 figs. [14 refs.] English summary pp. 26–27.]

One hundred and twenty-four cases of "Manchurian fever" (typhus) were investigated, the majority in Japanese. Typical Rickettsia were found in house rats and rat fleas caught in the houses of patients and also, it is stated, an intermediate type of the virus in body lice.

D. H.

ZINSSER (Hans). **Varieties of Typhus Virus and the Epidemiology of the American Form of European Typhus Fever (Brill's Disease).**—*Amer. Jl. Hyg.* 1934. Nov. Vol. 20. No. 3. pp. 513–532. [14 refs.]

This paper is an amplification of the shorter paper by the same writer which is summarized on page 154 (above). The first part is devoted to a discussion of the two typhus viruses, human and murine, and the author points out that although there are many points of resemblance yet they are not identical but are separate varieties or types of the typhus virus.

He has carefully investigated three strains of virus isolated from cases of Brill's disease in Boston and has found that all definitely belong to the human type.

A very thorough epidemiological survey of Brill's disease has been carried out in New York and in Boston and it has been established that 94·8 per cent. of the cases have occurred among immigrants from European countries where typhus fever is epidemic or endemic; at least 90 per cent. of these people were Polish Jews. The interesting points concerning Brill's disease as originally observed by Dr. BRILL himself and confirmed by the present investigation are that the disease is a mild form of typhus, that it does not spread by contact and that it is not carried by lice; to these points can now be added that the disease is apparently not occupational and is not carried by the rat flea.

It has been definitely established recently that the endemic typhus fever of the Southern States of North America and of Mexico is carried to man by the rat flea and that the rat is the reservoir of the virus. Zinsser is of opinion that Brill's disease is different and that the reservoir of the virus in this disease is man himself; Brill's disease he considers is the result of recrudescences of infections with the human virus, the original infection having been acquired in Europe. Many of the people who developed Brill's disease in New York had been from 10 to 30 years in the City.

[It is not clear whether it is suggested that these people had had definite attacks of fever in Europe or were infected without developing fever, the virus remaining latent without producing a lasting immunity, and the disease developing when this partial immunity broke down.]

D. H.

BAKER (J. N.), MCALPINE (James G.) & GILL (D. G.). **Endemic Typhus.**—*Amer. Jl. Public Health.* 1934. Oct. Vol. 24. No. 10. pp. 1068–1073. [16 refs.]

——, —— & ——. **Endemic Typhus in Alabama.**—*Public Health Rep.* 1935. Jan. 4. Vol. 50. No. 1. pp. 12–21. With 1 fig. [13 refs.]

These papers open with a discussion of the typhus problem from the historical and epidemiological point of view. They deal with the history of typhus in Alabama.

Endemic typhus was first reported in Alabama in 1922 by MAXCY and HAVENS as the result of positive Weil-Felix reactions [see this *Bulletin*, Vol. 21, p. 662]. Since then some 60 to 80 cases per year have been recorded almost entirely in the towns in the south and south eastern parts of the State ; but in 1932 there was a sudden rise to 237 cases with 11 deaths, and in 1933 some 823 cases with 35 deaths. From urban centres the disease has spread to purely rural areas. The seasonal occurrence, however, has remained constant throughout, with the summer and early autumn months accounting for most of the cases. Although the number of cases has increased, the mortality rate, about 5 per cent., has not. Much of the mortality is in the older age groups ; a contributing factor being a concurrent disease of the lungs, heart or kidneys. The Weil-Felix reaction is almost invariably positive with Proteus X19. Rat destruction and rat proofing of stores and houses are the measures of control recommended. *D. H.*

LORANDO (N.). Les réflexes rotuliens dans le typhus endémique. [**Knee Jerks in Endemic Typhus.**]—*Bull. Soc. Path. Exot.* 1935. Jan. 9. Vol. 28. No. 1. pp. 37–39.

The authors have tested some 10 cases of endemic typhus and in all have noted absence of knee jerks ; they suggest that this may help in the differential diagnosis from boutonneuse fever. *D. H.*

HELMAN (J.). **The Use of Whole-Blood from Convalescent Cases in the Treatment of Typhus Fever.**—*South African Med. Jl.* 1934. Oct. 27. Vol. 8. No. 20. p. 760. With 2 charts.

During an outbreak of severe typhus fever patients were treated by injections of whole blood from convalescent cases, with apparent benefit.

40 cc. of blood was given intramuscularly at the first injection and 20 cc. at a later period in the fever. The treated patients showed a marked improvement in the general condition after a day or two, convalescence was rapid and no complications followed. Two charts of treated cases are given. *D. H.*

VARELA (Gerardo), GAY (M. A. Parada) & AGUAYO (Manuel). Expériences avec le sérum contre le typhus exanthématique. [**Experiments with Anti-Typhus Serum.**]—*C. R. Soc. Biol.* 1934. Vol. 117. No. 31. pp. 436–438.

This serum was prepared by repeated intravenous injections of a horse with emulsions of killed Rickettsia obtained from irradiated rats. The horses were bled and the serum concentrated. It was found to protect guineapigs against the homologous Mexican virus but not

against the European epidemic virus. It is proposed to test the serum in the treatment of cases of the disease and also as a prophylactic measure. *D. H.*

CIUCA (M.), BALTEANU (J.) & CONSTANTINESCO (N.). Contribution à l'étude expérimentale du typhus exanthématique. Maladie inapparente du chat. [**Inapparent Typhus in the Cat.**]—*C. R. Soc. Biol.* 1934. Vol. 117. No. 31. pp. 511–513.

Cats were fed on the brain and spleen of guineapigs infected with typhus virus (blood of case of fever) ; no reaction was noted, no fever and no positive Weil-Felix reaction ; the animals were killed after an incubation period of 6 days and emulsion of the brain inoculated into guineapigs. These animals reacted with fever and when tested later were shown to be immune to the virus.

This experiment was done on three occasions with similar results.

D. H.

KLIMENTOWA (A. A.). Les rats comme réservoir du virus du typhus exanthématique. [**Rats as Reservoir of Typhus.**]—*Arch. Sci. Biol.* 1934. Vol. 35. Ser. B. No. 2. [In Russian pp. 603–610. [20 refs.] French summary pp. 610–611.]

Fifty-four rats captured in Leningrad were killed and with emulsions made of the brain, 18 guineapigs were inoculated intraperitoneally. From one group of guineapigs a virus was isolated which produced fever in the guineapigs but without an orchitis ; these animals were later immune to inoculation of rat virus but were not immune to the inoculation of the human typhus virus. *D. H.*

LÉPINE (P.). Absence habituelle du typhus murin chez les souris capturées à Athènes. [**Absence of Murine Typhus from Athens Mice.**]—*C. R. Soc. Biol.* 1934. Vol. 117. No. 35. pp. 848–849.

The author has already shown that when cases of endemic typhus are occurring in a district of the town the virus of that disease can be readily isolated from rats in that district. He now finds that it is not possible to isolate the virus from mice captured at the same time and in the same district. The white rat is more susceptible to the virus of typhus than is the wild rat ; and although the wild mouse is not susceptible the white mouse can be infected. *D. H.*

DURAND (Roger) & HOMBOURGER (Katia). Sensibilité de la souris à un virus typhique chinois et au virus de la fièvre pourprée. [**Susceptibility of the Mouse to a Virus of Typhus from China and to the Virus of Rocky Mountain Fever.**]—*Arch. Inst. Pasteur de Tunis.* 1935. Jan. Vol. 24. No. 1. pp. 70–76. With 2 charts.

NICOLLE and others have already shown that the murine typhus can be passaged in mice practically indefinitely whereas the historic virus dies out after one or two passages. The methods followed in the present investigation were similar to those employed by NICOLLE and LAIGRET [this *Bulletin*, Vol. 30. p. 883.]

Conclusion.—The mouse is susceptible to the Chinese virus but only reacts with an inapparent infection and the virus can only be passaged once or occasionally twice ; this virus therefore is a true typhus virus. Mice are highly susceptible to the virus of Rocky Mountain fever which can be passaged indefinitely in these animals. *D. H.*

KASAHARA (S.), YOSHIDA (S.) & OKAMOTO (Y.). Nachweis der Rickettsien in verschiedenen Organen der mit mandschurischen und japanischen endemischen Flecktyphusvirus infizierten Mäuse. [**Demonstration of Rickettsia in Various Organs of Mice infected with Manchurian and Japanese Endemic Typhus Virus.**]—*Zent. f. Bakt.* I. Abt. Orig. 1935. Mar. 18. Vol. 133. No. 7/8. pp. 406–411. With 5 figs.

Three strains of virus were employed, mice were first infected from guineapigs and the virus was then passaged in mice using large doses of virulent material. The mice were killed when infected and the various organs sectioned and stained and examined for Rickettsia ; these organisms were readily found not only in the tunica and omentum but also in cells in the liver, spleen, kidneys, lungs, adrenals and endocardium. These cells were peculiar in many ways and the authors call them Rickettsia cells. It was noted that the virus passaged through mice did not lose its virulence for guineapigs. *D. H.*

VAUCEL (M.) & HASLE (G.). Un cas d'affection du groupe " typho exanthématique " révélé par la maladie expérimentale du cobaye. [**Case of Fever of Typhus Group revealed by Guineapig Inoculation.**]—*Bull. Soc. Méd.-Chirurg. Indochine.* 1935. Jan. Vol. 13. No. 1. pp. 25–29. With 4 charts.

A soldier developed fever with marked nervous symptoms and extreme delirium. No rash, blood culture negative, Weil-Felix reaction negative. Diagnosis encephalitis ; death on 8th day. Blood taken during the fever was inoculated into 2 guineapigs ; after an incubation period of 4 days both developed fever with slight enlargement of the scrotum ; the virus was passaged. A true typhus virus (Pekin) was obtained and two of the animals which had recovered from the fever were inoculated ; both developed fever and died. It is considered, however, that the disease from which the patient died belonged to the group of typhus-like diseases. *D. H.*

BLANC (Georges) & MARTIN (L. A.). Iridocyclite expérimentale provoquée par virus typhique. [**Iridocyclitis Experimentally produced by Typhus Virus.**]—*C. R. Acad. Sci.* 1935. Mar. 4. Vol. 200. No. 10. pp. 865–867.

Inoculation of the virus of typhus and of Japanese River fever into the eye of rabbits produces a specific reaction characterized by iridocyclitis and inflammation of Descemet's membrane. In the present paper the authors show that the inoculation of the virus of murine typhus produces a similar reaction in the rabbit ; also the same condition can be produced in the eye of sheep, dog, monkey and pig.

An interesting point is that the specific reaction was just as severe in the eye of the sheep, an animal not susceptible to infection with

typhus virus, as it was in the eye of a susceptible animal such as the monkey or rabbit. Another unusual finding was that when one eye of an animal had reacted and recovered, if the other eye was inoculated with the same virus, a positive reaction resulted ; also if animals such as the monkey and the rabbit were immunized to the murine virus by intraperitoneal inoculation and were later tested by intraocular inoculation of the same virus, the specific reaction appeared just as it did in animals which had not been previously immunized. *D. H.*

TCHANG (J.) & LOTSONG (Simon). Les réactions sérologiques des animaux de laboratoire inoculés avec le virus du typhus exanthématique de Chine. [**Serological Reactions of Laboratory Animals inoculated with Chinese Typhus Virus.**]—*Arch. Inst. Pasteur de Tunis.* 1934. Dec. Vol. 23. No. 4. pp. 441–446.

Employing the Pekin strain of typhus virus for inoculation of animals the authors found that out of some 500 sera of guineapigs tested none gave a positive reaction with Proteus X19. Only 2 rats out of 23 inoculated gave a positive reaction but one-third of the rabbits gave positive results.

On the other hand when emulsions of Rickettsia were utilized in place of Proteus positive results in guineapigs were obtained in all cases if the sera were tested during the febrile period. Also similar results were obtained with white and grey rats and with rabbits.

D. H.

SPARROW (Hélène). Etude d'un virus typhique d'origine humaine isolé en Mongolie. [**Study of a Typhus Virus of Human Origin isolated in Mongolia.**]—*Arch. Inst. Pasteur de Tunis.* 1935. Jan. Vol. 24. No. 1. pp. 56–64.

This virus isolated from a severe case of typhus was described by Dr. GAJDOS [this *Bulletin*, Vol. 30, p. 876]. Apparently it was in some ways intermediate between a human virus and a murine virus. It was brought to Tunis by Dr. GAJDOS and studied there.

Fifty-one guineapigs were inoculated with the virus ; 38 were males and of these only five showed orchitis and in two the condition was slight and transient. Rats inoculated with the virus did not develop fever and only 3 out of 12 showed a positive Weil-Felix reaction of 1/40 to 1/80. The brains of these rats taken on the 10th to 12th day after inoculation were infective for guineapigs. Rabbits inoculated with the virus did not have fever but their serum gave a positive Weil-Felix reaction up to a dilution of 1/600. The Mongolian virus protected against a Tunisian strain of true typhus, and *vice versa*.

GAJDOS and CHANG in their original paper stated that this virus produced a very marked scrotal reaction in every male guineapig tested but in a later series of inoculations the reaction appeared only in half the guineapigs inoculated and was much milder in character. As is stated above when tested in Tunis only 3 out of 38 guineapigs showed definite orchitis and the virus gave all the usual reactions of a typical human virus ; (*a*) The fever curve in guineapigs was identical with that of the local human strain, (*b*) the virus could not be passaged in mice, and gave an inapparent infection in rats and rabbits ; and (*c*)

could be and was carried by lice. For these reasons the conclusion is that the Mongolian virus is a true human typhus virus. *D. H.*

RONSE (Marguerite) & BRUYNOGHE (Guy). Au sujet de l'entretien du virus du typhus exanthématique murin. [**Maintenance of the Virus of Murine Typhus.**]—*C. R. Soc. Biol.* 1935. Vol. 118. No. 12. pp. 1258–1260.

The particular murine virus studied in this research showed certain remarkable changes during passage in laboratory animals.

When first isolated the virus was highly virulent for wild rats and also for white rats and produced fever and orchitis in guineapigs ; after passage in guineapigs over a period of 18 months it was found to have lost its virulence for rats but still produced the marked effect on guineapigs.

The authors consider that these results were due not to any peculiarity in the virus itself but to the fact that in place of passaging the virus from guineapig to guineapig by the inoculation of emulsion of brain, they had employed emulsion of tunica tissue. Eighty passages were carried out in this manner. The virus had lost in virulence for the animal from which it was obtained, the rat, but had gained in virulence for the animal, the guineapig, in which it was maintained.

D. H.

LE CHUITON (F.) & BOURGAIN (M.). Tentative de mutation d'un virus du typhus murin en virus boutonneux, par passage dans l'organisme de *Rhipicephalus sanguineus.* [**Attempt to change the Virus of Murine Typhus into Boutonneuse Fever Virus by Tick Passage.**]—*Bull. Soc. Path. Exot.* 1934. Nov. 14. Vol. 27. No. 9. pp. 825–830. With 2 figs.

It has been suggested that the virus of endemic typhus might be transformed into the virus of boutonneuse fever by passage through ticks. The authors failed in their attempt.

The authors collected male and female ticks of the species *R. sanguineus* from districts free from either endemic typhus or boutonneuse fever. The ticks were fed on a guineapig during the fever produced by the virus of endemic typhus. Later on numerous larvae were collected from these ticks ; some larvae were emulsified and the emulsion inoculated into guineapigs and some were fed on guineapigs but none of the animals became infected and when tested later none showed any immunity to the virus of endemic typhus. *D. H.*

GIROUD (P.) & HABER (P.). Action de l'électropyrexie par les radiations à ondes courtes sur le cobaye infecté par un virus de typhus exanthématique. [**Effect of Short Wave Radiotherapy on Typhus in Guineapigs.**]—*C. R. Soc. Biol.* 1934. Vol. 117. No. 31. pp. 407–409. With 1 chart. Also in *Arch. Inst. Pasteur de Tunis.* 1935. Jan. Vol. 24. No. 1. pp. 84–85.

No effect whatever was noted on the course of the fever in treated guineapigs. But as the virus survived longer in treated than in untreated animals it is suggested that the action on the tissues had interfered with their resistance. *D. H.*

KRONTOWSKY (A. A.), JAZIMIRSKA-KRONTOWSKA (M. C.), SAVITSKA (H. P.) & SOLITERMAN (P. L.). Application de la méthode des cultures de tissus à l'étude du typhus exanthématique. V. Nouvelles expériences de culture du virus du typhus exanthématique par de nouveaux procédés. [**Culture of Typhus Virus by New Method.**]—*Ann. Inst. Pasteur.* 1934. Dec. Vol. 53. No. 6. pp. 654–663. With 8 charts. [29 refs.]

In previous tissue culture experiments the authors note that the tissue employed is taken from infected animals and is incubated along with healthy tissue cells. In the method of tissue culture described in this paper living tissue cells from normal animals are employed and the virus is obtained from the plasma of infected guineapigs and is added to the culture material in amount less than the minimal infecting dose.

The normal tissue cells employed were : (1) White cells from blood of guineapig ; (2) Portions of the membranes of the eyes of rabbits ; (3) Cells from peritoneal effusion of guineapigs. After 5 days' incubation portions of the tissue cells were removed and inoculated intraperitoneally into guineapigs and produced typical fever and the lesions of typhus infection ; showing that multiplication of the virus had taken place in the healthy tissue cells in culture. *D. H.*

NIGG (Clara). **On the Preservation of Typhus Fever Rickettsiae in Cultures.**—*Jl. Experim. Med.* 1935. Jan. 1. Vol. 61. No. 1. pp. 17–26. [20 refs.] [Summary appears also in *Bulletin of Hygiene.*]

The author observed that, while tissue cultures of murine rickettsiae in a serum-Tyrode mixture remained alive and virulent for several months at 37°C. and −20°C., they generally died out in a week or two at the intermediate temperatures of 20°C. and −4°C. Evaporation of water and escape of gas were prevented by sealing the flasks with paraffined rubber stoppers. It was not only stock strains that remained alive in culture at a suitable temperature for so long ; first generation cultures also remained virulent for at least 15 weeks at 37°C. Likewise, typhus-infected tissues, such as minced guineapig tunica, remained infective for at least 10 weeks at 37°C. when suspended in a serum-Tyrode mixture. *G. S. Wilson.*

DAVIS (Gordon E.). **The Weil-Felix Reaction in Experimental Rocky Mountain Spotted Fever and Certain Other Typhus-like Diseases.**—*Public Health Rep.* 1935. Mar. 22. Vol. 50. No. 12. pp. 404–412. [17 refs.]

FELIX has shown that if a passage virus of one of the typhus group of diseases is inoculated into rabbits "main" agglutinins are produced for the variety of Proteus X associated with that virus, but a second inoculation of the same virus does not produce stimulation of these agglutinins whereas a later inoculation of a heterologous virus into the same animal produces agglutinins for the variety of proteus associated with that virus.

Following up this suggestion the author has inoculated groups of rabbits intraperitoneally with guineapig passage virus of one of the typhus-like diseases and later with another.

The viruses employed were :—(1) Rocky Mountain spotted fever. (2) São Paulo exanthematic typhus. (3) Endemic typhus (United States). (4) Boutonneuse fever.

The Proteus X varieties utilized were OXK, OX2, HX2 and OX19.

Results.—All of the group of six rabbits inoculated with the São Paulo virus and subsequently with the virus of Rocky Mountain spotted fever gave a positive reaction with OX19, and OX2 after the first injection and no reaction after the second ; when the order of injection was reversed the result was the same.

Of 10 rabbits injected with the virus of spotted fever and subsequently with the virus of boutonneuse fever all gave a positive reaction with OX2, OX19 or both after the first injection and none after the second.

Of 24 rabbits inoculated with the virus of boutonneuse fever and subsequently with the virus of spotted fever all were essentially negative following the first injection and only four were positive after the second.

Six rabbits inoculated with the virus of endemic typhus gave a positive reaction with OX19 but the results were negative after the subsequent injection of spotted fever virus although all the animals were infected. When the viruses were injected in reverse order all animals gave a positive reaction with OX2 following the injection of spotted fever virus while only OX19 agglutinins appeared after the later injection of endemic typhus virus.

The interesting points brought out are that following injection of São Paulo or Rocky Mountain fever virus into rabbits X2 aglutinins are present even more regularly than X19 agglutinins. The author claims that this is the first record of the presence of X2 agglutinins in significant titre in rabbit sera following infection with any of the typhus viruses ; but see paper by PIJPER and DAU [*ante*, p. 154].

The results of the agglutinin experiments suggest the immunological identity of the viruses of São Paulo typhus and Rocky Mountain fever and the close relationship but not identity of the virus of boutonneuse fever with these viruses. *D. H.*

BLANC (Georges) & GAUD (Maurice). La vaccination contre le typhus exanthématique au Maroc. Premières applications de la méthode par vaccin vivant bilié. [**Vaccination against Epidemic Typhus in Morocco. First Use of a Living Vaccine attenuated by Ox Bile.**]—*Bull. Acad. Méd.* 1935. Apr. 2. 99th Year. 3rd Ser. Vol. 113. No. 13. pp. 407–419. With 3 figs.

The virus employed had been isolated from rats in Casablanca and passaged in guineapigs ; it was known to give only a very mild attack of fever in man [*ante*, p. 163].

The experiment was divided into 3 categories.

1. Inoculation of 723 men in a penitentiary where all were healthy and there was no typhus.
2. Inoculation of 850 men, women and children in an infected locality where lousing had already been carried out.
3. Inoculation of 607 persons in an infected population where no lousing had been done.

A total of 2,180 persons was inoculated. There were no severe reactions in any of the inoculated and in both the infected localities the disease was checked. *D. H.*

KLIGLER (I. J.) & ASCHNER (M.). **Immunization of Animals with Formolized Tissue Cultures of *Rickettsia* from European and Mediterranean Typhus.**—*Brit. Jl. Experim. Path.* 1934. Dec. Vol. 15. No. 6. pp. 337–346. With 3 charts. [17 refs.] [Summary appears also in *Bulletin of Hygiene.*]

Tissue cultures of Rickettsia were put up with guineapig tunica, guineapig serum, and Tyrode solution. The inoculum with the European virus was infected louse guts, with the rat virus infected guineapig tunica tissue. The cultures were incubated at 28°–30°C. For preparation of vaccine 2–3 week old cultures were generally used. A thorough suspension of the material was obtained by grinding, freezing and thawing, and 0·1 per cent. formol was added. This vaccine was found to be sterile and non-infective even in large doses. Experiments made on a small number of guineapigs seemed to show that it was possible to protect against subsequent infection with living Rickettsia provided at least three fairly large doses were given. Rabbits inoculated repeatedly with the vaccine developed a positive Weil-Felix reaction. The authors conclude that successful immunization with killed Rickettsia is mainly a question of adequate dosage.

G. S. Wilson.

LAIGRET (Jean) & DURAND (Roger). Essais négatifs d'atténuation des virus typhiques par le vieillissement. [**Negative Attempts at Attenuation of Typhus Virus by Aging.**]—*Arch. Inst. Pasteur de Tunis.* 1935. Jan. Vol. 24. No. 1. pp. 77–83.

By " vieillissement " is meant the retention of the virus in an incubator or room at a temperature of 20°C. for 2 or 3 days. This method has already been successfully employed in the preparation of vaccines from the viruses of rabies and yellow fever. " Desiccation " as employed in preparation of rabies vaccine is of little use ; it is the time and temperature in the process that cause attenuation of the virus.

Two typhus viruses were used in the present investigation, a human virus and a rat virus. Emulsions of the brain of infected guineapigs and rats were made in glycerine and exposed to a temperature of 20°C. for 2 to 4 days and attempts were then made to immunize normal guineapigs without producing symptoms of disease. Results were negative and the authors state that this method cannot be utilized for the preparation of typhus vaccine. *D. H.*

MASAYAMA (Suguru). Experimentelle Untersuchung ueber den Uebertragungsmechanismus von Flecktyphus- und Fleckfieber-Virus durch die Kleiderlaus. [**Experimental Research on the Method of Infection by Lice in Typhus.**]—*Jl. Oriental Med.* 1935. Jan. Vol. 22. No. 1. [In Japanese pp. 177–205. With 1 text fig. & 6 figs. on 1 plate. [16 refs.] German summary pp. 15–16.]

The author states that it is not yet quite clear how typhus virus is carried by lice from the sick to the healthy. He describes his investigations, which, however, do not seem to add anything material to what is already known. *D. H.*

BLEWITT (Basil). **Review of Fevers of the Typhus Group (Vector Unknown) occurring at Ahmednagar during 1933.**—*Jl. Roy. Army Med. Corps.* 1934. Nov. & Dec. Vol. 63. Nos. 5 & 6. pp. 313–319 ; 379–387. With 3 figs.

In Ahmednagar during 1931 there were no cases of fevers of the typhus group reported ; in 1932 there were 8 and in 1933, 13. All occurred in the months September to December inclusive, a definite seasonal incidence ; during these months the cases were strictly limited to areas which had certain features in common, viz., the presence of water, mango trees, rank grass and tick infested buffaloes.

In one case, which occurred in a child in a bungalow in the cantonment, the grazing in the compound had been let for the first time and buffaloes were grazed there for some days before the child was taken ill. Out of 13 cases investigated, however, only two were able to state definitely that they had been bitten by ticks, which they had removed from their bodies ; in one case fever followed 15 days later, in the other 18 days after the tick bite ; the ticks were not seen by the author.

A very careful description of the clinical course of the disease is given. The fever lasted about 14 days and was severe, resembling boutonneuse fever, apart from the fact that a primary sore was never detected. Photographs show the appearance and distribution of the rash. In the opinion of the author the macular rash occurs early on the soles but owing to the thickness of the skin is not detected ; later the petechial form of the rash appears and is readily seen. There were no fatal cases in the series and all made a rapid convalescence.

Laboratory investigations.—Blood cultures taken early in the fever were all negative and in 50 per cent. of the cases the peripheral blood showed a slight polynuclear leucocytosis. In some of the inoculated men there was a slight rise of the agglutinin for *Bact. typhosum* during the course of the fever. The Wassermann and Kahn reactions were negative in all cases in the first week, but 75 per cent. gave a positive reaction in the 3rd week and 80 per cent. in the 4th week ; all, however, were again negative by the 6th week. As regards the Weil-Felix reaction a dilution of 1/125 was taken as a base line and anything over this as definitely positive, especial note being made of a rising titre. Sixty per cent. of the cases gave a positive reaction during the 2nd week and 100 per cent. were positive during the 3rd week ; the highest titre obtained was 1/500.

Three strains of Proteus X were employed ; X19 was agglutinated in highest dilution, X2 being next and XK least, but this strain was also agglutinated. *D. H.*

i. SACHS (Albert). **Notes on Seven Cases of the Indian Typhus-like Fevers.**—*Jl. Roy. Army Med. Corps.* 1935. Mar. Vol. 64. No. 3. pp. 163–173. With 7 charts & 5 figs.

ii. MACNAMARA (C. V.). **An Epidemic of Typhus (Vector Unknown) in the Simla Hills.**—*Ibid.* pp. 174–183. With 1 map.

i. Seven cases of typhus are described, occurring at the stations of Jubbulpore, Bareilly and Peshawar. Two of the seven gave a history of tick bite and one of these proved fatal.

Careful notes are given of this fatal case ; death was due to double bronchopneumonia with hyperpyrexia. There was nothing characteristic in the post-mortem appearances which were those of many acute

infections. Rickettsia was not found in the tissues but round-celled infiltration and arteriolitis were noted in the liver. The rash in this case was definitely petechial. In the other cases the rash was maculo-papular involving the face and the palms and soles and was very marked ; photographs are given. All the patients developed inflammation of the bronchi followed by pneumonia. The pulse was slow in relation to the temperature.

Laboratory findings.—Blood cultures taken on the 4th to the 6th day were all negative. Widal reaction, a sympathetic rise in the H agglutinins for *Bact. typhosum*, was noted. In the fatal case, death on the 11th day, the Weil-Felix reaction was only positive, 1/50, for OX19. In cases 3 and 4 HX19 was agglutinated in a dilution of 1/250 and 1/1,000. Case 5 gave the following results :—

	7th day	10th day	17th day
OX19	nil	1/250	1/500
OXK	nil	nil	nil

ii. There is no record of this disease in the Simla Hills before 1932 in which year there were 5 cases with 2 deaths. In the present epidemic, 1934, there were 15 cases ; all occurred in the period just before the rains, August–September–October, ceasing when the rains broke. Nothing could be discovered as to the vector and in no case was there any history or trace of insect bite. It has been suggested that the Indian squirrel, recently introduced into the district, may be a reservoir.

Clinical.—Onset sudden, severe headache was practically the only symptom complained of, flushed face, injected conjunctivae, pulse slow in relation to the temperature, which was high. The rash appeared on the 5th day and consisted of blotchy macules. The serum of all the cases agglutinated emulsions of OXK in high dilution ranging from 1/150–1/250,000 with a rising titre. [This is the first series of cases of the disease in India in which definite agglutination results have been obtained.]

[It is interesting to compare these two series of cases, the one occurring in the Hills, the other in large stations in the plains of India. In the one series (Macnamara) the disease was mild although the fever was high and prolonged, the rash was faint and ill-defined and the only symptom was severe headache. All the sera agglutinated OXK, some in as high a dilution as 1/250,000. In the other series (Sachs) the cases were severe with lung complications and a very definite and obvious papular and in the one case (fatal) petechial rash. The sera of the cases in this series agglutinated X19 in low dilution but did not agglutinate OXK.] *D. H.*

Boyd (J. E. M.). **Indian Typhus : a Patient's Views.**—*Jl. Roy. Army Med. Corps.* 1934. Dec. Vol. 63. No. 6. pp. 394–398.

Colonel Boyd who is a keen entomologist and trained clinician, himself suffered from the disease, cases of which he had already had the opportunity of observing in his hospital. He notes that it differs from true typhus in that there is no stupor nor delirium, nor oedema of the face and the mortality is nil. As regards the vector lice could be

definitely excluded and in the cases observed by him and in his own case there was no record of tick bite; as he says "we one and all denied any knowledge of having been bitten by ticks." [In other countries similar diseases may be conveyed by the larval form of the tick which is of minute size and may readily escape detection; the bite may be painless.]

In his own case Colonel Boyd noted that the staining of the skin following the rash was still visible six months after the fever had ceased; he also points out that the severe headache and toxaemia render the patient disinclined to take nourishment and those in charge should see that suitable fluid diet is provided and that it is consumed; otherwise convalescence may be prolonged owing to the patient's weakness. *D. H.*

ROBERTS (J. Isgaer). **The Ticks of Rodents and their Nests, and the Discovery that *Rhipicephalus sanguineus* Latr. is the Vector of Tropical Typhus in Kenya.**—*Jl. Hygiene.* 1935. Feb. Vol. 35. No. 1. pp. 1–22.

Part I of this paper deals with ticks in relation to rodents and their nests in Kenya.

It had been suggested that plague and plague immunity in rodents may be connected with tick infestation but this suggestion was not confirmed by investigations. The common ticks found on rodents and in their nests are the larval stages of *Haemaphysalis leachi* and *R. simus* neither of which attack man although the former is often found on dogs, cattle and game.

Part II is concerned with the rôle of *Rhipicephalus sanguineus* as the vector of typhus in Kenya.

The commonest form of tick on man in and around Nairobi and in the endemic typhus centres is not *R. sanguineus* but *R. pulchellus*; any one walking through long grass in pursuit of game or in the "rough" on the local golf course is bound to pick up many of these ticks and the bite of the larval form gives rise to small ulcers and in one case this was the tick removed from the site of a primary sore in a case of typhus. Numerous experiments were carried out by emulsifying *pulchellus* ticks and injecting the emulsion into guineapigs but all were negative.

R. pulchellus although common in the grass is rarely found on dogs or in houses, whereas it has been observed that *R. sanguineus* is what might be described as a "house" tick and at certain seasons of the year large numbers can be found in the woodwork of houses, common hiding places being behind the picture rails and in the frames of wooden chairs; the houses where these ticks are found are "doggy" houses. An investigation revealed that 100 per cent. of houses in which dogs were kept were infested by *R. sanguineus*. Ticks were collected from houses where cases of typhus had recently occurred, emulsified and injected into guineapigs; fever, swelling of the scrotum and other symptoms of typhus infection resulted. It is therefore concluded that the vector of tropical typhus in Kenya is the dog tick *R. sanguineus* which infests the houses in that country and that the disease is similar to fièvre boutonneuse in its clinical symptoms and in its etiology.

It is recommended that houses should be disinfested by means of the blow lamp and furniture by fumigation. *D. H.*

CANNAVO (Letterio). Ricerche sul virus bottonoso siciliano. [**The Virus of Boutonneuse Fever in Sicily.**]—*Riforma Med.* 1934. Nov. 24. Vol. 50. No. 47. pp. 1799–1804. With 2 figs. [18 refs.]

The author collected ticks (*Rhipicephalus sanguineus*) from dogs roaming about Palermo. These ticks he washed repeatedly, first with a weak solution of corrosive sublimate and then with physiological saline; he then triturated them with more saline and injected the emulsion into the glutei of a Capuchin monkey (Cebus). A febrile condition resulted and the serum of the animal acquired agglutinins for Proteus X19; it recovered.

Blood was taken into citrate at the height of the fever and was injected intraperitoneally into guineapigs. These in turn became febrile and died in about a month. At autopsy granule formation was marked in the liver, but abundant also in the lungs and elsewhere, shown by microscope to be necrotic in nature. There was also a testicular reaction, but Rickettsia were not discovered there. The boutonneuse fever of Sicily which has been notified from various Provinces—Previtera, Bongiovanni in Catania; Ingrao and Scaturro in Agrigento; Gulino and Cannavò in Palermo, etc.—is, the author states, due to this virus and that cases are not more common is explained by the fact that these ticks rarely bite man. *H. H. S.*

GIORDANO (Mario). La febbre esantematica del Littorale Mediterraneo in Tripolitania. [**Boutonneuse Fever in Tripolitania.**]—*Arch. Ital. Sci. Med. Colon.* 1935. Mar. 1. Vol. 16. No. 3. pp. 161–185. With 1 folding map. English summary (3 lines).

This is a "congress" paper giving a general review of the subject of boutonneuse fever in Tripolitania. The author gives detailed accounts of 20 cases, 14 adults and 6 children between $1\frac{3}{4}$ and 9 years of age, dating back to 1913.

One patient's serum gave a positive Weil-Felix reaction and this, it is stated, was probably a case of Brill's disease; the rest proved negative during the course of the illness and in convalescence, although 11 strains of Proteus were tested. Sera from 6 out of 11 dogs from places where cases had occurred reacted positively. It is worthy of note that inoculation of emulsion of rats' brains and of triturated Hippobosca caught on dogs in the house of one of the patients gave positive results in guineapigs and rabbits. A spot map shows the distribution of 16 of the cases: 8 occurred in Tripoli itself and 8 outside the town.

H. H. S.

CAMINOPETROS (J.), CONTOS (B.), PHELOUKIS (T.) & PAGONIS (A.). Action curative dans la fièvre boutonneuse d'un sérum expérimental de cheval préparé. [**Curative Action of Serum prepared from Horse in Boutonneuse Fever.**]—*Bull. Soc. Path. Exot.* 1935. Jan. 9. Vol. 28. No. 1. pp. 22–30. With 6 figs. & 3 charts.

A serum was prepared from horses by inoculation of an emulsion of infected ticks intradermally and into the conjunctiva. By both routes a local reaction resulted and fever followed. One horse received 52 and the other 23 inoculations at intervals of 15 days. The animals were then bled. Five cases of boutonneuse fever were treated by

means of this serum ; its administration had a marked effect on the course and severity of the disease ; in place of the usual 12 days fever in untreated cases the fever ceased on or about the 7th day.

Two cases of endemic typhus were treated with the serum but its administration had no effect whatever. *D. H.*

AUGIER (P.) & COSSA. Syndrome d'encéphalite avec rigidité pallidale au cours d'une fièvre boutonneuse méditerranéenne. [**Encephalitis with Pallidal Syndrome in Boutonneuse Fever.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1935. Mar. 18. 51st Year. 3rd Ser. No. 9. pp. 432–436.

A very severe case of boutonneuse fever characterized by encephalitis with marked and painful general spasm of the muscles and pain in the joints. In this case the central nervous system was the seat of the attack of the virus. *D. H.*

LOMBARDO (Fortunato). Esperienze sulla presenza del virus tifico esantematico del Mediterraneo nei cani. [**The Virus of Mediterranean Typhus in Dogs.**]—*Ann. d'Igiene.* 1935. Jan. Vol. 45. No. 1. pp. 1–6. [14 refs.]

The author tested the sera of 50 dogs in Messina for their agglutinating activities with Proteus X19. Thirty-one agglutinated in dilution of 1 : 25 or over, thirteen in 1 : 50, seven in 1 : 100 and four up to 1 : 200. Ticks caught on these dogs were triturated and injected into guineapigs and produced a febrile reaction and in some cases enlargement of the spleen. Human cases of the disease, states the author, are not found in the Commune. *H. H. S.*

KIAN (Loe Ping). Twee gevallen van tropical (" shop ") typhus bij Chineesche kinderen. [**Two Cases of Shop Typhus in Chinese Children.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1935. Mar. 5. Vol. 75. No. 5. pp. 447–464. With 2 figs. [31 refs.] English summary.

The following diseases caused by Rickettsia are known in the Dutch Indies : " pseudotyphus " (Schüffner) or Sumatra mite fever (van Driel) and tropical typhus W and K variety. The K type (scrub typhus) is predominant in Malacca and on the East Coast of Sumatra but in Java the W form (shop typhus) seems to be more common.

The two forms of tropical typhus can be readily differentiated by means of the Weil-Felix reaction. In the opinion of the author a positive reaction with Proteus X strains has value if the following requirements are met with.

(1) The agglutination with alcohol suspensions of Proteus X strains should be positive.

(2) There should be a rising titre of agglutination during the illness.

(3) When living motile Proteus X strains are employed the agglutination should be only of the granular (O) type and if the serum is heated to 65°C. for one hour the reaction should be negative.

Two cases of typhus in children are described. X19 was agglutinated and the fevers were diagnosed as shop typhus (W variety).

D. H.

O'Connor (M. P.). **The Marris Atropine Test in Tropical Typhus.**—*Malayan Med. Jl.* 1934. Dec. Vol. 9. No. 4. p. 204.

The Marris test was largely employed in the diagnosis of typhoid fever during the war. The author employed this test in 12 cases of scrub typhus and in 10 a positive reaction was obtained.

In a healthy person the injection of 1/33 of a grain of atropine results in a rise in the pulse rate of 15 beats per minute or more. In typhoid fever no such rise takes place. [See this *Bulletin*, Vol. 9, p. 466, and Vol. 11, p. 432.] *D. H.*

Lewthwaite (R.) & Savoor (S. R.). **Tropical Typhus (Rural Type) and the Tsutsugamushi Disease as encountered in the Federated Malay States. The Isolation and Maintenance of Strains of these Two Diseases in the Rabbit by the Intraocular Inoculation of Virus ; and the Demonstration of Cross-Immunity between these Two Strains.**—*Far Eastern Assoc. Trop. Med. Trans. Ninth Congress, Nanking, China, 1934.* Vol. 1. pp. 249–257.

The paper deals with the relationship of the virus of the rural form of tropical typhus to that of tsutsugamushi fever as it occurs in Malaya.

In 1925 Fletcher showed that there were two types of " tropical typhus " in Malaya which he called the urban and the rural types ; it was suggested that the vector of the rural type might be a larval tick. Since then a few cases of tsutsugamushi fever with a definite primary sore and bubo have been described, the vector in this case being a mite, *T. deliensis*. The serum of the " rural typhus " cases and the tsutsugamushi cases agglutinates the K variety of Proteus OXK and the serum of the urban typhus cases the W variety of OX19. The rural type of typhus and tsutsugamushi disease resemble one another so closely clinically, apart from the presence of the primary sore in the latter, that Fletcher suggested later that in this disease also the vector might be a mite and not a tick.

The authors have demonstrated cross immunity between rural typhus and tsutsugamushi.

In this investigation the authors used rabbits as experimental animals and inoculated the virus (defibrinated blood of cases of fever taken as early as possible) into the anterior chamber of the eye, a method employed by Japanese workers in investigating tsutsugamushi disease in Japan. The specific reaction which follows, after an incubation period of 4–15 days, consists in circumcorneal injection, inflammation of the iris and turbidity of the aqueous humour. Two strains of the virus of tsutsugamushi fever were used and four of the virus of rural typhus. It was found that the homologous strains protected against reinoculation in the sound eye with the same strain of virus and also that the virus of tsutsugamushi fever protects rabbits against the virus of rural typhus and *vice versa*, *i.e.*, complete positive crossed immunity.

Also rabbits which had been inoculated intraperitoneally with the virus of rural typhus or the virus of tsutsugamushi developed agglutinins for OXK in their serum in dilution up to 1/500. The development of these agglutinins in the rabbits' sera is often delayed and the highest estimations were not obtained till the 60th day after inoculation. Typical Rickettsia bodies were found in smears from the

membranes of the eye in infected animals, but only in small numbers in some cases ; these findings were identical in each case. *D. H.*

KAWAMURA (R.), IMAGAWA (Y.) & ITO (T.). **The Weil-Felix Reaction in Tsutsugamushi Disease and its Relation to Endemic Typhus in Manchukuo and Formosa.**—*Kitasato Arch. Experim. Med.* 1935. Jan. Vol. 12. No. 1. pp. 26–57. With 2 charts. [25 refs.]

Most of this paper is taken up in refuting the statement, made some years ago, that tsutsugamushi fever and the K type of tropical typhus can be differentiated by the results of the OXK agglutination reaction. This standpoint has already been abandoned by workers in Malaya.

The authors find that the sera of healthy persons does not agglutinate OX19 or OX2 but that OXK may be agglutinated up to 1/100. In 38 persons suffering from various diseases, especially gonorrhoea and suppurative disease, OXK was agglutinated up to a dilution of 1/200 and in two cases 1/400. It is added that the OXK reaction in tsutsugamushi disease may remain positive for several years after the fever.

Forty-nine sera of tsutsugamushi fever cases were examined, 13 during the febrile period ; all were negative to OX19 and OX2 but positive with OXK ; 6 cases were found to have a titre over 1/1,600 and one as high as 1/25,000.

Sera from cases in Formosa and Boko Island were also tested and gave positive reactions to OXK up to 1/800. The Japanese cases gave the highest reaction, those from Boko the next and those from Formosa the lowest.

The primary sore is constantly present in patients in Japan Proper, but is often absent in Formosa and East Indies. *D. H.*

NICOLLE (Charles) & SPARROW (Hélène). Quelques expériences sur le virus de la fièvre fluviale du Japon (Tsutsugamushi). [**Experiments on Tsutsugamushi Virus.**]—*C. R. Acad. Sci.* 1934. Dec. 10. Vol. 199. No. 24. pp. 1349–1351.

The authors obtained the virus of Japanese River fever from Japan and have maintained it in the laboratory by passage in rats, in which the virus produces an inapparent infection.

In monkeys the virus produced a fever similar to that of typhus ; one monkey out of 11 died. Only a few of the guineapigs inoculated developed fever and none died. None of the rabbits inoculated developed fever but the blood of the animals was infective for monkeys. Inoculation of the virus into the eye of the rabbit produced a typical local reaction and Rickettsia was readily demonstrated in the cells of the membranes of the eye. The serum of some of the infected monkeys agglutinated Proteus OXK and not OX19.

Lice were fed on monkeys during the fever ; the virus was viable in these insects for 7 days but their bite was not infective. The virus was found to survive in fleas (*X. cheopis*) for 11 days and to be transmissible by their bite. *D. H.*

KOUWENAAR (W.) & WOLFF (J. W.). **Experimental Sumatran Mite Fever in Guinea-Pigs.**—*Jl. Infect. Dis.* 1934. Nov.–Dec. Vol. 55. No. 3. pp. 315–327. With 2 figs. [20 refs.]

Sumatran mite fever was described for the first time in the year 1908 by SCHÜFFNER under the name " pseudo typhus of Deli."

The fever in this disease usually resembles that of typhoid fever but an initial sore, similar to that in Japanese River fever and boutonneuse fever, is invariably present and is accompanied by lymphangitis. The death rate in the Javanese is about 5 per cent. but in Europeans about 40 per cent. SCHÜFFNER on the analogy of tsutsugamushi disease suggested that the disease might also be carried by a mite and in 1923 WALCH identified this mite as *Trombicula deliensis*, a species closely related to *T. akamushi*.

Clinically it is not possible to separate Sumatran mite fever from tsutsugamushi disease; the authors therefore attempted to differentiate the diseases by means of animal experiments. It was found that the virus of Sumatran mite fever produced a mild fever in monkeys with a primary papule at the site of injection, but a very severe and often fatal disease in guineapigs (63 per cent. mortality); exactly the opposite occurs with the virus of tsutsugamushi disease—a mild non-fatal infection is produced in guineapigs and a severe and fatal infection in monkeys. *D. H.*

WOLFF (J. W.) & KOUWENAAR (W.). Onderzoekingen over de Sumatraansche mijtekoorts. V. [**Sumatran Mite Fever. V.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1934. Nov. 20. Vol. 74. No. 24. pp. 1608–1618. With 5 figs. on 1 plate. [12 refs.] English summary.

KOUWENAAR (W.) & WOLFF (J. W.). Onderzoekingen over Sumatraansche Rickettsiosen. VI, VII & VIII. [**Investigations of Sumatran Rickettsiases. VI, VII & VIII.**]—*Ibid.* Dec. 4. No. 25. pp. 1659–1670. With 3 figs. on 1 plate & 1 graph. [14 refs.]; 1935. Jan. 8 & 22. Vol. 75. Nos. 1 & 2. pp. 34–38. With 2 graphs & 1 plate; pp. 117–123. English summaries.

V. Infectieproeven op witte muizen. [**Experimental Infection of White Mice.**]

White mice have been proved to be very susceptible to the virus of Sumatran mite fever; nearly 100 per cent. of the infected animals died. A description is given of the symptoms noted in the mice and of the post-mortem changes. The mean duration from the time of infection to the death of the animal was 11 days. The principal changes seen post-mortem were haemorrhagic inguinal glands, enlarged spleens, small-celled infiltration between the liver cells and sometimes an exudate in the pleural and peritoneal cavities. Rickettsia could always be detected in smears from peritoneum, pleura or omentum.

No difference was noted between the symptoms produced by the virus of Sumatran fever and that produced by the virus of "scrub" typhus.

VI. Een Rickettsiose uit Varkensteken. [**A Rickettsiasis from Ticks from Wild Pigs.**]

It has been suggested that ticks as well as mites may be capable of transmitting the virus of Sumatran "mite fever." [If this is so the name given is unfortunate].

Dermacentor and Rhipicephalus ticks were collected from people in areas where mite fever and scrub typhus are prevalent and also from wild pigs in the same districts. Emulsions were made of these ticks and injected into guineapigs, monkeys and rabbits. In some of these animals fever was produced and Rickettsia were found in the tissue cells

but the lesions produced were entirely different from those produced by the virus of " mite fever." The serum of some of the wild pigs agglutinated OXK up to a dilution of 1/250 but did not agglutinate OX19.

VII. Infectieproeven met mijtekoorts op *Macacus fuscatus*, de Japansche aap. [**Experimental Infection of the Japanese Monkey, *M. fuscatus*, with Mite Fever.**]

VIII. Infectieproeven met mijtekoortsvirus op hoogere apen. [**Experimental Infection of Various Monkeys with Mite Fever.**]

In previous papers the authors have recorded the results of the action of the virus of Sumatran " mite fever " on several species of monkeys. They found that the virus of this disease produces only a mild fever in monkeys without any lasting immunity, whereas the virus of tsutsugamushi fever in Japan produces a severe and often fatal illness in the species of monkey, *M. fuscatus*, employed in that country. The authors considered that these differences might be due to the fact that different species of monkeys were employed in the experiments. They therefore obtained from Japan some *M. fuscatus* and inoculated them with the local virus ; exactly the same result as before resulted, namely only a mild fever and no lasting immunity ; moreover one of the monkeys which had been rendered immune to the virus of tsutsugamushi fever in Japan was found to be susceptible to the virus of Sumatran mite fever. For these and other reasons the authors consider that the viruses of Japanese River fever and Sumatran mite fever are not identical. *D. H.*

MONTEIRO (J. Lemos). Essais de transmission expérimentale du typhus exanthématique de São Paulo par la punaise *Cimex lectularius*. [**Attempts to transmit São Paulo Typhus by *Cimex lectularius*.**]—*C. R. Soc. Biol.* 1935. Vol. 118. No. 9. pp. 918–920.

Bed bugs were infected by feeding on guineapigs during the febrile period. The conclusions are as follows :—

1. The virus of São Paulo typhus is active immediately after its ingestion by the bugs but loses its activity after the short delay of 24 hours.

2. Tests after 48 and 72 hours, 5, 10, 13, 16 and 35 days all gave negative results, whether by inoculation of excreta or the crushed up bugs, or by feeding the bugs on guineapigs.

The authors suggest that the positive results reported by MAGALHÃES were due to the use of a Mexican typhus virus and not the São Paulo virus. *D. H.*

MONTEIRO (J. Lemos). O " typho exanthematico de S. Paulo " e suas relações com a febre maculosa das Montanhas Rochosas, á luz das provas de immunidade cruzada. [**The Relations between S. Paulo Typhus and Rocky Mountain Fever in the Light of Cross-immunity Tests.**]—*Mem. Inst. Butantan.* 1933–1934. Vol. 8. pp. 207–220. [10 refs.] English summary.

The virus of Rocky Mountain fever for these tests was obtained from the National Institute of Health and the R.M. Spotted Fever Laboratory, Hamilton. Infected specimens of *Dermacentor andersoni* were

also received from Hamilton. The experimental animals were guinea-pigs. It was found that guineapigs immunized against S. Paulo typhus failed to react to R.M. fever virus obtained from infected ticks. Again, guineapigs recovered from R.M. fever are immune to S. Paulo typhus virus, and Dr. R. E. DYER of the National Institute of Health has communicated to the author that a monkey after an attack of R.M. fever is also immune to S. Paulo typhus virus. The author concludes that both belong to the same group " whose type infection is the Rocky Mountain spotted fever, of which it [S. Paulo typhus] may represent but a variety." *H. H. S.*

TRAVASSOS (J.) & MONTEIRO (J. Lemos). Contribuição ao estudo da reacção de Weil-Felix na infecção experimental pelos virus do " typho-exanthematico de S. Paulo" e febro maculosa das Montanhas Rochosas. [**The Weil-Felix Reaction in S. Paulo Typhus and Rocky Mountain Spotted Fever.**]—*Mem. Inst. Butantan.* 1933–1934. Vol. 8. pp. 57–80. With 1 graph. English summary.

Among 60 patients suffering from S. Paulo typhus 41 or 68·3 per cent. gave a positive Weil-Felix reaction with Proteus X19. The days of the disease on which the reactions were taken are of interest. Of 24 sera examined in the first 5 days, 14 were positive (58 per cent.) ; between the sixth and tenth days 22 out of 36 (61 per cent.) ; between 11 and 15 days 20 out of 23 (87 per cent.) ; of 8 between the 16th and 20th days all were positive ; of 9 tested later than this 7 were positive ; in other words the percentage of positive reactions rose till the 20th day and then began to decline.

Experimental inoculation into rabbits of the S. Paulo virus and that of Rocky Mountain fever, showed that the serum reacted in a higher titre with R.M., but the decrease is sharper and more definite than in the case of S.P. infection ; in this the decrease is more gradual. This applies to both Proteus OX2 and OX19. As regards Proteus OXK the titres giving agglutination were more irregular but more stable on the whole with S.P. infection sera. With OXL the titre of serum giving a positive is high in both infections, but decreases in the same way as with OX2 and OX19, *i.e.*, more sharply and definitely with R.M. sera.

The reaction with Proteus OXL, OX2 and OX19 differs in experimental infection from what is observed in natural human infection with S.P. virus ; the titre agglutinating the two former is higher than for the third in experimental infection, the reverse occurring in human cases, while the titre for Proteus OX19 and OXL is higher than for Proteus OXK with R.M. fever sera. *H. H. S.*

MONTEIRO (J. Lemos). Comportamento experimental do coelho aos virus do " typho exanthematico de S. Paulo " e da febre maculosa das Montanhas Rochosas. [**Reaction of Rabbits to S. Paulo and Rocky Mountain Fever Viruses compared.**]—*Mem. Inst. Butantan.* 1933–1934. Vol. 8. pp. 39–46. With 3 graphs & 4 figs. (2 coloured) on 1 plate. English summary (9 lines).

Intraperitoneal inoculation of the S. Paulo typhus virus into rabbits gave rise to a typical febrile reaction, but while some showed no scrotal reaction at all, others showed oedema and a slight hyperaemia which subsided in a few days. In the case of the virus of Rocky Mountain

fever similar inoculation was followed by oedema, haemorrhage and necrosis of the scrotum. The differences are such that in spite of the mutual production of immunity [dealt with elsewhere] the author is of opinion that the viruses are distinct. *H. H. S.*

MONTEIRO (J. Lemos). Vaccina contra o "typho exanthematico" de S. Paulo. Novas correlações entre esta infecção e a febre maculosa das Montanhas Rochosas. [**Vaccination against S. Paulo Typhus. Relations between this Disease and Rocky Mountain Spotted Fever.**]—*Mem. Inst. Butantan.* 1933–1934. Vol. 8. pp. 9–20. With 5 graphs. [10 refs.] English summary (9 lines).

The vaccine employed was prepared by trituration of ticks, *Amblyomma cajennense*, infected by feeding on a guineapig, itself in a febrile state from infection with S. Paulo virus. For the exact details of the preparation the original article should be consulted. This vaccine was first tested on guineapigs and found to be potent in prophylaxis. It was then tested as regards its protective properties against the virus of Rocky Mountain fever and found effective in a single dose. The reverse of this was then tried out, using Parker's vaccine for Rocky Mountain fever for its protective properties against infection by the São Paulo virus. Whereas a single dose of the first (S. Paulo vaccine) protected equally against either, two doses of the Parker's vaccine were needed to protect guineapigs against the São Paulo virus.

It was found also that these animals after being immunized against Rocky Mountain fever, if the original infection was severe, were immune also to the São Paulo typhus. *H. H. S.*

DA CUNHA (A. M.). Sur la culture des *Rickettsia* du typhus exanthématique de São Paulo dans la membrane chorio-allantoide de l'embryon de poulet. [**Culture of the Rickettsia of São Paulo Typhus on the Membranes of the Chick Embryo.**]—*C. R. Soc. Biol.* 1934. Vol. 117. No. 30. pp. 392–394. With 1 fig.

Fertilized eggs were placed in an incubator at 40°C. and incubated for 7 to 10 days; small windows were then made in the shells and the membranes were inoculated with the virus of São Paulo typhus (spleen of infected guineapigs). The virus was introduced by means of a sterile pipette between the membranes and the opening sealed with paraffin. The eggs were returned to the incubator for a further period of 3 to 5 days and examined by making sections of the membranes and staining by Gram and fuchsin. A portion of the thickened infested membrane was removed and injected into a guineapig; this animal developed fever but no Rickettsia could be found until the 3rd passage.

It is noteworthy that Rickettsia could not be found in the original inoculum (spleen of infected guineapig) but were found in section of the embryo membrane. *D. H.*

FRUGONI (C.). Febbre bottonosa e sodoku.—*Policlinico.* Sez. Prat. 1935. Jan. 7. Vol. 42. No. 1. pp. 6–17. With 2 graphs & 1 fig.

NICOLLE (Charles) & GIROUD (Paul). L'observation des épidémies tunisiennes des typhus historique et murin et l'étude de leurs virus montrent que ces deux maladies sont étrangères l'une à l'autre.—*C. R. Acad. Sci.* 1934. Dec. 26. Vol. 199. No. 26. pp. 1553–1555.

DE OLIVEIRA CASTRO (G. M.) & BIER (Otto). Pesquizas sobre o tifo exantematico de São Paulo. Distribuição do virus no sangue.—*Rev. Med.-Cirurg. do Brasil.* 1935. Mar. Vol. 43. No. 3. pp. 97–101. With 1 fig.

PANAYOTATOU (A.). Observations sur une communication de P. Lépine à propos du virus exanthématique d'Athènes.—*Bull. Soc. Path. Exot.* 1934. Nov. 14. Vol. 27. No. 9. pp. 833–834.

SPÄT (W.). Fleckfieberstudien.—*Med. Klin.* 1934. Oct. 19. Vol. 30. No. 42. pp. 1395–1398.

CARRION'S DISEASE.

MACKEHENIE (Daniel). Verrue péruvienne et typhus exanthématiques. [**Verruga and Typhus.**]—*Rev. Sud-Américaine de Méd. et de Chirurg.* Paris. 1934. Dec. Vol. 5. No. 12. pp. 747–762. With 2 figs. [52 refs.]

The purpose of this paper is twofold :—

1. To supply to readers of the journal recent knowledge concerning Carrion's disease.
2. To repeat a suggestion made some ten years ago that Carrion's disease should be classed with the typhus-like diseases.

For 25 years, the author states, Peruvian medical men have recognized that Oroya fever and verruga peruviana are separate manifestations of one and the same disease.

He himself has seen several cases of severe fever with a pernicious type of anaemia which have recovered from that condition and have then developed a typical verruga rash with fever and muscular pains. CARRION inoculated himself from a verruga case, developed Oroya fever with extreme anaemia and died. ROSSELL on the other hand accidentally inoculated himself from a case of Oroya fever and developed verruga peruviana. Bartonella have been cultivated both from verruga eruption and from Oroya fever cases. These facts clearly prove that the conditions are merely symptoms of the same disease.

The name bacilliformis is unfortunate as the germ is not found in true homogeneous rods but the common form is a minute diplococcus, the two cocci being united by a clear capsule. In this form the organism is indistinguishable in the tissues or blood from Rickettsia. The methods which give the best results for the staining of Rickettsia are also best for Bartonella.

The method which the author has found best for demonstration of Rickettsia and Bartonella in the peripheral blood is to employ dehaemoglobinized thick films and to stain with ammoniated toluidine blue in methyl alcohol. Bartonella are found in the red cells whereas Rickettsia are not, and Bartonella can be cultivated in Novy-Nicolle blood agar whereas Rickettsia can only be cultivated in the presence of living tissue cells.

As regards the clinical aspect, apart from the anaemia and fever the author has noted a marked action of the germ on the central nervous system and this also links the disease with typhus, in fact in the early stages the two diseases are often confused.

The incubation period may last for some weeks and the course of the disease may be expressed somewhat graphically as follows :—

Incubation—latent period—anaemia—rash—latent period—immunity —the whole course lasting over many months; the germ has been cultivated from the blood over a period of one year.

After an experience lasting some 30 years the author considers that the severe fatal pernicious type of anaemia is now rarely met with and that the disease is altering in character just as other diseases have done in the course of time. *D. Harvey.*

FROHN (W.). Ein Fall von Verruga peruviana (Carrionsche Krankheit). [**Case of Verruga Peruviana.**]—*Dermat. Ztschr.* 1934. Feb. Vol. 68. No. 5. pp. 245–251. With 3 text figs.

A case of verruga observed in Europe and successfully treated with salvarsan.

A young man, a member of an expedition to South America, was severely bitten by sandflies while in the Peruvian Andes at an elevation of 17,000 feet. A few days later he developed fever and later became anaemic; he showed also symptoms of amoebic dysentery. He was invalided to Europe and on arrival in Hamburg one or two nodules were noted on the face and hands. In the clinic at Innsbruck the case was definitely diagnosed as verruga on the clinical picture and the histological findings on examination of the nodules; over 80 of these tumours were counted. Injections of salvarsan were quickly followed by disappearance of the rash. *D. H.*

MALDONADO (Angel). Nuevo criterio para explicar la distribución geográfica de la enfermedad de Carrión.—*Crónica Méd.* Lima. 1933. Feb. Vol. 50. No. 836. pp. 41–48.

YELLOW FEVER.

MORGAN (M. T.). **Some Notes on a Tour of Inspection of the Co-operative Anti-Yellow Fever Service in Brazil.** With Appendix by J. A. KERR.—31 + 11 mimeographed pp. With 2 maps, 10 figs., 1 plan & 4 charts. [Report presented to the Office International d'Hygiène Publique, April-May Session, 1935, by the Delegate for Great Britain.]

An interesting account of the co-operative anti-yellow fever service in Brazil, together with general notes and observations obtained during the course of a visit to South America extending over a period of two months, during which the author was shown the details of the work being done by Dr. F. L. SOPER of the Rockefeller Foundation, and also spent nearly a month in the Planalto Region, where a rural type of yellow fever was in progress.

In a brief historical survey of yellow fever in Brazil attention is called to the marked changes that have resulted in our knowledge of the disease as a result of recent scientific discoveries. These may be summarized as follows :—

Previously.	*Now.*
Severe clinical disease considered typical ;	Severe classical case considered atypical in native population of endemic areas ;
Absence of reported cases indicated absence of disease ;	Absence of reported cases not accepted as absence of disease ;
Yellow fever essentially urban and transmitted only by *Aëdes aegypti* ;	Yellow fever may continue at least for a period of months in rural areas, with transmission by *Aëdes aegypti*, or even in the absence of this mosquito ;
Key centre control believed effective in clearing surrounding area.	Key centre control not effective in Brazil.

The co-operative system, founded in 1930, embraces yellow fever control throughout the whole of Brazil and is entirely Brazilian, staffed with Brazilian officers and men, but with the direction and advice of experts of the Rockefeller Foundation. It can be divided, arbitrarily, into five main divisions.

1. *The administrative service*, technically a division of the Federal public health service, with an annual cost of $2,250,000 to which the Rockefeller Foundation contributes $250,000.

2. *The anti-stegomyia service*, whose object is to clear towns of stegomyia, especially coastal towns, which may act as potential centres of infection. A number of teams have been appointed in each of the towns in which the service operates and details are given of the way in which they work. It has been found more economical to maintain a low index, less than 0·01 per cent., rather than to be satisfied with indices of 1 per cent. to 5 per cent. and a series of charts shows the results that have been obtained. Apart from its primary object the psychological effects of mosquito suppression are very beneficial, and at present the use of mosquito nets has disappeared from Rio de Janeiro and many other towns which formerly had the worst of reputations for yellow fever.

3. *Mouse-protection test surveys*, which are a valuable indication of where to suspect the disease and where to direct measures for control. The results of tests in the younger age groups in the Amazon Valley, where yellow fever has not been recognized during 20 years, indicate that a war in this district, with the consequent movement of non-immune troops, might well result in disastrous outbreaks of the disease, such as occurred at Santa Cruz, Bolivia, in 1932.

4. *Viscerotomy service*, whereby a routine collection of liver specimens is made at any centre, where either protection tests or doubtful clinical cases lead to any suspicion of the existence of yellow fever. [For details of the method of collection and the results of examination see this *Bulletin*, Vol. 31, p. 836.]

The organization of this service is based on the following assumptions :—

(*a*) That the existence of yellow fever in a community over a period of months will result in some fatal infections ; (*b*) that the yellow fever liver usually carries characteristic lesions ; and (*c*) that, when fatal yellow fever kills rapidly, its victims rarely surviving more than 10 days.

5. *Field surveys*, in hitherto uninvestigated areas, which are a constant feature of the Brazilian service. Reference is made to two of them which resulted in the discovery of a rural endemicity hitherto quite unsuspected. The first of these was the well-known discovery of yellow fever without *Aëdes aegypti*, in the Valle do Chanaan, Espirito Santo [see this *Bulletin*, Vol. 31, p. 77] and the second, an outbreak first recognized in April, 1934, in the Planalto of Matto Grosso. The author had the opportunity of visiting this very remote part of the world which has never been properly surveyed and borders unexplored country. The area affected was part of this sparsely populated region on the plateau dividing the head waters of the Amazon and Paraguay rivers. Blood protection tests from 343 inhabitants of the region showed 67 positive, 274 negative and 2 doubtful. *Aëdes aegypti* seems to be absent, but *Aëdes scapularis* is abundant during the wet season and may be the carrier. Since the inhabitants live in isolated clearings in the forest it is improbable that man is the reservoir. The only animal in any numbers that moves from place to place is the monkey which abounds in the forest. The possibility of monkeys acting as reservoirs of infection is supported by the fact that three out of four specimens of blood from monkeys living in the vicinity of an Ecuador epidemic were found to protect mice.

These two epidemics in sparsely populated rural areas show that the old conceptions of yellow fever as essentially a disease of large towns must be abandoned. On the day of leaving Rio de Janeiro, the author was informed of the discovery of a positive liver specimen from the vicinity of Goyaz, and according to latest reports there is a widespread epidemic in that region, with more than 100 deaths up to date. Here again *Aëdes aegypti* seems to be absent.

In conclusion the author pays a tribute to the work of the Federal Yellow Fever Service in Brazil.

The appendix by Dr. J. A. Kerr contains a useful account of the technique that has been adopted for dealing with the very large numbers of tissue specimens sent to the laboratory as a result of the viscerotomy regulations. *E. Hindle.*

SUSSINI (Miguel), VACCAREZZA (Raul F.) & ALVARADO (Carlos Alberto). Profilaxis de la fiebre amarilla. Organizacion del servicio en el Norte Argentino. [**Organization of the Yellow Fever Preventive Service in Northern Argentine.**]—131 pp. With 9 maps & 21 figs. Publicado en Los Anales del Departamento Nacional de Higiene. 1934. Buenos Aires. P. Ventriglia.

An interesting and instructive account of the measures undertaken to deal with the menace of invasion of the Northern Argentine by yellow fever. Establishment of the Service was stimulated by the outbreak in Santa Cruz de la Sierra (Bolivia) in April 1932. Investigation of seven districts revealed that Aëdes breeding was abundant in five. In July four sanitary stations were created, at Aguaray, Tartagal, Embarcación and Orán ; later two more, at Ledesma and Formosa, with sanitary posts in five other districts.

The authors next give a geographical description of the zones threatened, followed by details of the measures adopted, the subjects being considered in the following order :—

1. The factors concerned : *Aëdes aegypti* and its bionomics ; the human susceptible host, telluric conditions, soil, humidity, temperature, etc.

2. The general plan of campaign : education of the people, personal protection, larvicides and the introduction of larvivorous fish. A later chapter treats of these last in detail ; the species utilized were *Aphyocharax erytrurus*, *Bryconamericus stramineus*, *Poecilurichthys bimaculatus* and *Aequidens vittatus* and descriptions and illustrations are given of all four.

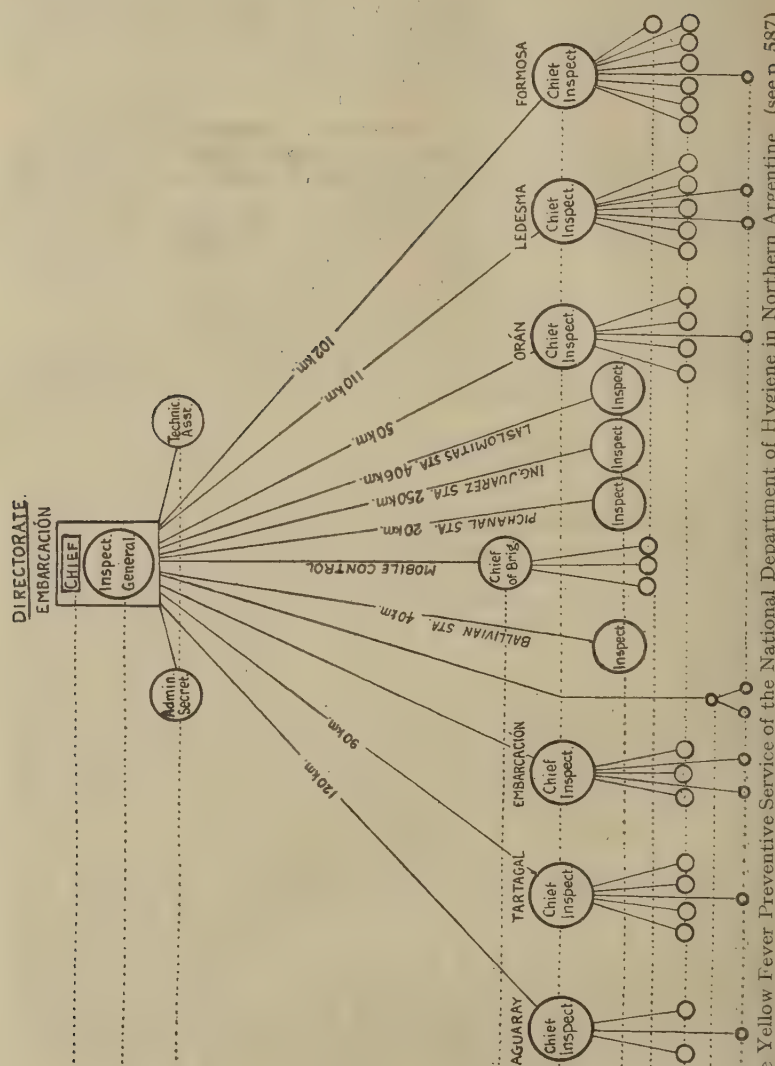
3. The forms to be filled in are referred to and in an appendix copies are given indicating the information required regarding patients, their surroundings and circumstances, water supply, etc., and the action taken to deal with the conditions found. In an appendix are printed the rules, regulations and instructions for the guidance of the various officials connected with the Service, and copies of the notices sent out and the forms to be filled in.

4. Next is a clear account of the personnel of management and control which is well seen in the accompanying scheme (p. 588).

The story is then related of the development of the campaign and the results achieved by it in the different areas selected for special and intensive measures. Illustrations are given to point out the prevailing defects, collections of rubbish and so forth [but these are poorly reproduced and far from distinct even in the original ; they have no legend and are consequently not easy to interpret and in fact this can only be done by reference to the text].

Another chapter treats of the distribution and density of *Aëdes aegypti* in Northern Argentine, where the index of the number of dwellings infected to the number inspected varied in the district of the campaign up to 90 per cent. in Ballivián and outside the zone of its action from nil in Cerrillos to 66·9 in Estación Perico. An accompanying map gives much information on this point but unfortunately is too indistinct in the original to bear reproduction.

H. H. S.



Organization of the Yellow Fever Preventive Service of the National Department of Hygiene in Northern Argentine (see p. 587).

GOURVIL (E.). L'endémicité amaryle chez les indigènes du Soudan. [**Yellow Fever Endemicity in the Natives of the (French) Sudan.**]—*Bull. Soc. Path. Exot.* 1935. Jan. 9. Vol. 28. No. 1. pp. 31–32.

The author gives notes on small outbreaks of yellow fever in Sikasso during 1931, and in Kayo, during 1931 and 1932, which support the view that the infection is widespread among natives of the French Sudan. Segregation of European habitations from the native quarters is advocated. *E. H.*

GOURVIL (E.). Remarques à l'occasion d'une épidémie de fièvre jaune. [**Remarks on the Occurrence of a Yellow Fever Epidemic.**]—*Bull. Soc. Path. Exot.* 1935. Jan. 9. Vol. 28. No. 1. pp. 32–34.

A brief summary of the clinical symptoms observed in seven cases (five fatal) of yellow fever among Europeans at Sikasso in 1931. In every case except one the typically severe headache—"coup de barre"—was absent, and the patients merely felt extreme lassitude without any localized pains. Vomiting was a constant feature, although curiously enough the two cases showing "black vomit" were the only ones who recovered. Albuminuria was generally present but the urine of one of the patients, collected shortly before death, was negative. A slight degree of jaundice was the rule, but never very pronounced. All the patients showed extreme prostration, and during the apyretic phase some of them presented typical nervous symptoms, which always indicated a very grave prognosis. *E. H.*

PUBLIC HEALTH REPORTS. 1935. Jan. 25. Vol. 50. No. 4 pp. 101–102.—**Yellow Fever and the Recent Decree on "Viscerotomy" in Colombia.**

A discussion by Dr. G. BEVIER concerning the purpose of making viscerotomy compulsory, in certain cases, in order to clear up the situation with regard to rumours of yellow fever outbreaks in Colombia.

In addition to earlier outbreaks that have been subsequently diagnosed by means of the protection test many suspicious cases have occurred at Muzo. During 1934, in January, March and June, small outbreaks occurred there, and in the last two the diagnosis of yellow fever was confirmed by both pathological examination and protection tests. Several deaths suggestive of yellow fever also occurred in Caparrapi during 1933 and at the beginning of 1934. Judging from these results the disease seems to be gradually spreading westward and it is feared that it may reach Puerto Leivano, Guaduas, Utica, or Villeta. An epidemic with suspicious signs has developed in the vicinity of Restrepo (Meta) and is being investigated at present. It is evident that yellow fever is still a problem in Colombia and possibly a menace; the National Department of Health is therefore organizing a special unit to study the disease. *E. H.*

NICOLLE (Ch.). Au sujet de la vaccination contre la fièvre jaune. [**Concerning Vaccination against Yellow Fever.**]—*Bull. Acad. Méd.* 1935. Feb. 19. 99th Year. 3rd Ser. Vol. 113. No. 7. pp. 254–256.

The author discusses the advantages of vaccination by means of living and attenuated virus alone, compared with the use of virus and

immune serum. From a practical point of view it is concluded that sero-vaccination must now be replaced by the use of virus alone, since it has been shown to be innocuous, and to produce an active immunity.

E. H.

PUBLIC HEALTH REPORTS. 1935. Mar. 15. Vol. 50. No. 11. pp. 360–371. **Yellow Fever. Some Recent Contributions to our Knowledge of the Prevalence and Control of the Disease.**

A useful summary of recent publications, especially regarding the occurrence of yellow fever and methods of protection, printed for the information of quarantine officers and others interested in the subject.

E. H.

FINDLAY (G. M.) & CLARKE (L. P.). **Reconversion of the Neurotropic into the Viscerotropic Strain of Yellow Fever Virus in Rhesus Monkeys.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1935. Apr. 17. Vol. 28. No. 6. pp. 579–600. With 2 text figs. & 8 figs. on 2 plates. [27 refs.]

An important paper showing that it is possible to reconvert neurotropic yellow fever virus into the ordinary viscerotropic type.

The virus used in these experiments had undergone 182 to 212 passages in the brains of mice and was a typical neurotropic strain. When inoculated directly into the livers of rhesus monkeys it gave rise to lesions in the liver, less extensive than but similar in type to those caused by ordinary viscerotropic virus. Further subcutaneous injections of virus obtained from intrahepatic passage resulted in the production in rhesus monkeys of typical yellow fever with lesions in the liver, stomach, kidney and heart. Intracerebral inoculations of this virus into monkeys gave rise to similar lesions associated with varying degrees of encephalitis.

This reconverted virus behaved as a typical viscerotropic virus not only in rhesus monkeys but also in white mice and hedgehogs. It again lost its viscerotropic pathogenicity after repeated intracerebral passages in mice.

In an interesting discussion of the constitution of yellow fever virus the authors come to the conclusion that the ordinary viscerotropic and fixed neurotropic strains represent two extreme types connected by a series of intergrades or intermediate types in which either viscerotropic or neurotropic pathogenicity may predominate, according to the animal species inoculated, the tissue in which the virus grows, and also individual idiosyncrasy.

The fact that in the laboratory the virus of yellow fever can be induced to undergo such rapid changes in its pathogenicity raises the question whether similar changes may not sometimes occur under natural conditions in the field. *E. H.*

THEILER (Max) & HUGHES (Thomas P.). **Studies of Circulating Virus and Protective Antibodies in Susceptible and Relatively Insusceptible Monkeys after Inoculation with Yellow Fever.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1935. Mar. 8. Vol. 28. No. 5. pp. 481–500. With 10 charts. [20 refs.]

The authors have determined the virus content and development of protective antibodies in various species of *Macaca* and *Lasiopyga*

inoculated in various ways with either unmodified viscerotropic yellow fever virus or the modified neurotropic strain.

Their results show that when susceptible monkeys, including *Macaca mulatta* (=*Macacus rhesus*) and *M. cynomolga*, are inoculated by any route with unmodified yellow fever virus, extensive multiplication of the virus occurs, usually followed by death. In some instances there is multiplication of virus without any obvious signs of infection but followed by immunization. When very small doses were used (0·0000001 cc. serum virus) the incubation period might be prolonged to as much as 14 days, but as a rule the maximum quantity of virus in the serum was reached in about 3 days. Protective antibodies appear in the serum a few days after the virus can be detected in the blood stream ; in fatal infections they may or may not be formed, but do not arrest the course of the disease.

The modified neurotropic virus, when inoculated by any route, also multiplies and gives rise to antibody formation. If this virus comes into contact with brain tissue, either by intracerebral inoculation or any other brain injury, encephalitis results.

The inoculation of both kinds of virus into African green monkeys, *Lasiopyga callitrichus*, was followed by multiplication, usually without symptoms, and by the subsequent development of protective antibodies. If the virus was inoculated intracerebrally, encephalitis resulted. Apart from the decreased response to unmodified virus, inoculated either intraperitoneally or subcutaneously, the reaction of these animals to yellow fever virus seems to be essentially the same as that of *rhesus* monkeys. *E. H.*

SELLARDS (Andrew Watson). **The Infection and Immunization of Mice by Intraperitoneal and Subcutaneous Injection of the Virus of Yellow Fever.**—*Ann. Trop. Med. & Parasit.* 1935. Apr. 25. Vol. 29. No. 1. pp. 55–68. [15 refs.]

A study of the effects of extra-neural injections of yellow fever virus into mice, with special reference to immunity and to inapparent infection.

Mice that had been inoculated either subcutaneously or intraperitoneally with neurotropic or ordinary virus, were subsequently tested for inapparent infection mainly by three procedures :—(1) the intracerebral inoculation of their blood and other tissues into normal mice ; (2) tests for active or passive immunity ; (3) the intracerebral injection of sterile starch paste to facilitate the localization of virus in the brain.

Only a small proportion of the inoculated mice died of encephalitis, and of the survivors in some instances the virus died without producing any effect and in other cases an active immunity developed.

The intracerebral inoculation of blood and heavy suspensions of liver, spleen, adrenals and kidney, of mice that had been injected extraneurally with neurotropic virus, in no case resulted in the production of encephalitis.

The development of active immunity in mice which remained apparently well after the extraneural injection of neurotropic virus affords strong evidence of an inapparent infection, but there is some suggestion that after longer passages in the brains of mice, he virus becomes less effective in producing immunity. Mice that have survived an intracerebral inoculation of virus do not remain refractory,

but even after a few months may become infected by a second inoculation.

Two lots of 25 mice were inoculated, one lot subcutaneously and the other intraperitoneally, with viscerotropic virus. One of the first and two of the second lot died of encephalitis, and only seven out of the total survivors were immune against a subsequent intracerebral inoculation of virus.

A further batch of mice was inoculated either subcutaneously or intraperitoneally with neurotropic virus. These two groups were then divided into several lots of 6 each. On each successive day for 6 days one lot from each group was inoculated intracerebrally with starch. The results show that many of the intraperitoneal group (15 of 41) died of encephalitis, but only 6 survivors were immune; whilst in the subcutaneous group 6 out of 41 died of encephalitis, but 18 were immunized.

A second experiment gave similar results, which are interpreted as showing that there is less danger of invasion of the blood stream after subcutaneous than after intraperitoneal inoculation. *E. H.*

ADVIER. Etude expérimentale de la fièvre jaune. [**An Experimental Study of Yellow Fever.**]—*Ann. de Méd. et de Pharm. Colon.* 1934. Oct.–Nov.–Dec. Vol. 32. No. 4. pp. 441–472.

A detailed account of experiments confirming most of the well-known facts regarding the infection of monkeys and mice with yellow fever and the technique of protection tests.

A strain of yellow fever was obtained from a fatal case of the disease in a European. Although two monkeys were successfully infected with this strain and died with typical symptoms, the author failed to establish the strain in mice by intracerebral inoculation. It is noted that infected blood from this case of yellow fever had lost its infectivity when mixed with broth and kept at 37°C. for 24 hours, whilst a similar mixture kept in the ice chest remained infective. *E. H.*

SELLARDS (Andrew Watson). **The Interpretation of the Incubation Period of the Virus of Yellow Fever in the Mosquito** (*Aëdes aegypti*). —*Ann. Trop. Med. & Parasit.* 1935. Apr. 25. Vol. 29. No. 1. pp. 49–53. [10 refs.]

An interesting discussion of the significance of the incubation period of yellow fever virus in the mosquito.

In opposition to the view of DAVIS, FROBISHER and LLOYD [see this *Bulletin*, Vol. 31, p. 81] who concluded that the incubation was required not for the multiplication of virus, but for its migration to the salivary glands, the author prefers the view that the virus multiplies in its insect host. The initial loss of the virus content in the mosquito is paralleled by many examples in protozoal infections, when after being ingested by a suitable host many of the parasites die, and only a few establish themselves and multiply. It is pointed out that under the same temperature conditions the incubation period of the virus is similar in both its vertebrate and invertebrate hosts (4 days at 37°C. in the mosquito). The lengthening of the incubation period as the temperature is lowered is consistent with the view that the virus grows more readily at a higher temperature, and the experiments

recorded by DAVIS and his associates are regarded as furnishing evidence that the virus multiplies in the insect host. *E. H.*

FINDLAY (G. M.) & STERN (Ruby O.). **Encephalomyelitis produced by Neurotropic Yellow Fever Virus.**—*Jl. Path. & Bact.* 1935. Mar. Vol. 40. No. 2. pp. 311–318. With 10 figs. on 3 plates. [18 refs.]

A record of the lesions produced in the central nervous system of susceptible animals—monkeys, guineapigs, mice and hedgehogs—after infection with neurotropic yellow fever virus.

In every case the virus produced an inflammatory reaction in the central nervous system, degenerative changes in the nerve cells, and acidophilic intranuclear inclusions. The inflammatory reaction was characterized by infiltration with mononuclear cells and proliferation of the microglia; it was much less marked in animals inoculated either subcutaneously or intranasally.

Degenerative changes in the ganglion cells were present in all stages from slight swelling of the cell body to neuronophagia with complete disintegration of the cell. The specific acidophilic intranuclear inclusions were seen only in ganglion cells which had not undergone extensive degeneration and never in cells showing neuronophagia. These inclusions did not stain with the Feulgen technique and were larger than the acidophilic granules sometimes found in the nerve cells of these animals, which are stained by this method. Demyelination was not observed. *E. H.*

BAUER (Johannes H.) & HUGHES (Thomas P.). **Ultrafiltration Studies with Yellow Fever Virus.**—*Amer. Jl. Hyg.* 1935. Jan. Vol. 21. No. 1. pp. 101–110. [14 refs.]

A record of filtration experiments with two strains of yellow fever virus, confirming FINDLAY and BROOM's estimate of the size of the virus particles, and their observation that in this respect there is no difference between neurotropic and viscerotropic strains. [See this *Bulletin*, Vol. 31, p. 499.] *E. H.*

SHANNON (Raymond C.); PUTNAM (Persis). **The Biology of Stegomyia under Laboratory Conditions. I. The Analysis of Factors which influence Larval Development** [SHANNON & PUTNAM]. **II. Egg-Laying Capacity and Longevity of Adults** [PUTNAM & SHANNON]. —Reprinted from *Proc. Entom. Soc. Washington.* 1934. Oct. Vol. 36. No. 7. pp. 185–216. With 9 figs. [15 refs.]; pp. 217–242. With 5 figs.

The authors desire to put our knowledge of the biology of the yellow-fever mosquito on a solid quantitative basis. In the present papers they set out a considerable body of numerical fact.

The papers contain a mass of useful work, carefully recorded. Among other things they tell us the conditions under which the maximum number of mature dry eggs will hatch quickly. The authors find considerable differences between their results and those published by other workers, and the view is expressed that these may be due to differences in the strain of *Stegomyia*; is it not equally possible that

they are due to different conditions or to the presence of micro-organisms in the water? The matter could perhaps best be investigated if experiments with different strains were carried out side by side under aseptic conditions. With regard to the biology of the larva, facts are given about the mortality under certain standard laboratory conditions. One observes that with improved technique the mortality was lowered, and also that a greater uniformity in rate of development followed. Studies were also made on the mortality caused by over-crowding. Reference is made to the optimum conditions, but they are in no way defined.

Biological studies on the adult female give information on the number of eggs which are laid under certain conditions of feeding, etc. Here comparison is also made between the mortality of females which were given blood at regular intervals (and which therefore laid eggs) and others which never received blood and which were kept alive with honey and water. In the second group there were very few deaths in the first ten weeks, after which the number of deaths suddenly became great. The curve relating mortality to time therefore approaches the rectangular; but the corresponding curve for the females which received blood and laid eggs is of the more usual S shape.

In certain parts of the paper it seems that the statistical analysis has been carried further than the accuracy of the experiments warrants; for instance, the authors give facts on the mean duration of larval life as affected by temperature, but temperature was not controlled and was measured in the air of the laboratory, not in the breeding jars, at 8 a.m. and 4.30 p.m. There is therefore no evidence that the mean temperatures recorded were close to the mean temperatures to which the insects were exposed; but in spite of this comparative crudity in the experiments, the statistical analysis is of a high degree of elaboration. *P. A. Buxton.*

ROZEBOOM (Lloyd E.). **The Relation of Bacteria and Bacterial Filtrates to the Development of Mosquito Larvae.**—*Amer. Jl. Hyg.* 1935. Jan. Vol. 21. No. 1. pp. 167–179.

The author has set himself to discover whether mosquito larvae (generally those of *Aëdes aegypti*) can breed in sterile water containing organic material in solution, and whether the larvae grow as well in a pure culture of known bacteria as they do in unsterilized water containing bread crumbs.

The eggs were sterilized in hexylresorcinol, and controls transferred to a suitable unsterile medium hatched well. The sterility of the experimental tubes was examined by testing for aerobes and anaerobes. Since the rate of growth of larvae is used as a criterion, it would have been well to control the temperature. The paper describes a large number of experiments in which the results appear clear and consistent. The most important findings are that larvae in sterile filtered water taken from breeding places lived no longer than those in sterile distilled water, none of them reaching the second stage. Larvae provided with living pure cultures of known micro-organisms were able to grow, though not always as rapidly as the controls: adults were generally produced, though the larval mortality was high in most cases. The author provides support for his view that it is the bacteria and not the results of their metabolism on which the larvae live.

The interesting observation was made that larvae live long but grow very slowly in an autoclaved mixture of water and bread crumbs. It would be interesting and valuable to test the result of adding salts, possibly nutritive materials, accessory food factors, etc., and the author has begun to explore this subject. *P. A. Buxton.*

HOFFMANN (W. H.). Tropenarzt und Gelbfieber.—Reprinted from *Jahrbuch d. Miss. ärztl. Inst. z. Würzburg.* 1934. Vol. 11. p. 19.

SOPER (Fred L.). El problema de la fiebre amarilla en América.—*Bol. Oficina Sanitaria Panamericana.* 1935. Mar. Vol. 14. No. 3. pp. 204–213.

RELAPSING FEVER AND OTHER SPIROCHAETOSES.

SINGER (Ernst). Die Wirkungsweise der Chemotherapeutika bei Spirochäten- und Protozoeninfektionen. [**The Mode of Action of Chemotherapeutic Substances in Spirochaetal and Protozoal Infections.**]—*Med. Klin.* 1935. Mar. 22. Vol. 31. No. 12 (1579). pp. 386–389.

A useful summary of the author's view on the mode of action of chemotherapeutic agents, based mainly on the results obtained by the analysis of spirochaetes and trypanosomes before and after treatment with various arsenical and gold preparations [see this *Bulletin*, Vol. 31, p. 510].

He emphasizes that the direct action of chemotherapeutic agents on spirochaetes and trypanosomes, as shown by the rapid disappearance of these organisms from the blood, is only one part of the curative action. The other part depends on the immune reaction of the host, especially the influence of the chemotherapeutic agent on the cells of the host, but this is a pharmacological problem about which relatively little is known at present. However, the methods of analysis which have been developed for the examination of spirochaetes and trypanosomes are applicable to the study of what happens to chemotherapeutic agents in the tissues of the host, and seem likely to lead to fruitful results. *E. Hindle.*

VON JANCSÓ (N.) & NOVÁK (E.). Mikrobiologische Grundlagen der chemotherapeutischen Wirkung. II. Mitteilung: Mikroskopischer Nachweis des chemotherapeutisch verabreichten Goldes in Spirochäten, Trypanosomen und Bakterien durch Ultrakristallisation. [**A Microbiological Basis for Chemotherapeutic Action. Part II. The Microscopic Demonstration of Chemotherapeutic Gold in Spirochaetes, Trypanosomes and Bacteria by Means of Ultra-Crystallization.**]—*Zent. f. Bakt.* I. Abt. Orig. 1935. Apr. 25. Vol. 134. No. 1/2. pp. 76–86. With 2 text figs. [15 refs.]

The authors have used the fact that extremely small quantities of gold can be seen by means of dark ground illumination to demonstrate its presence in spirochaetes from infected rats and mice treated with various gold compounds.

The animals were infected with a Russian strain of *S. recurrentis* and at the height of the infection injected with potassium gold cyanide, Solganal A or B, or similar compounds. One hour after treatment the spirochaetes show a massive impregnation with gold and in thin air-dried films examined by means of dark ground illumination the parasites stand out in bright gold on a black background.

For the preparation of films three methods are recommended :—

(1) Extremely thin smears of defibrinated blood containing the spirochaetes after treatment.

(2) The incineration method, applied to concentrated masses of spirochaetes obtained by centrifugation. The heart blood of an infected rat after treatment is defibrinated, then centrifuged at about 1,000 revolutions per minute to remove any blood cells. The supernatant fluid is spun at about 7,500 revolutions per minute to bring down the spirochaetes,

which are then washed twice in either human serum or filtered sheep serum. Smears are made of the concentrated spirochaetes on slides which will withstand heat and on which there is no trace of any fat or minute scratches. The slides are then heated above a Bunsen flame, at first film side upwards until the film turns brown, and finally with the film side downwards until the slide is red hot. The slides are allowed to cool slowly and when examined by dark ground illumination the spirochaetes, represented only by ash containing gold particles, stand out against the dark background.

(3) Permanent preparations can be made by placing air-dried films in a developing solution which must be freshly prepared and is composed of :—

100 cc. Distilled water.
2·5 cc. Gold chloride solution.
3·0 cc. Potassium carbonate solution.
1·25 cc. Potassium ferricyanide solution.

The gold chloride solution contains 2·51 gm. $Au\ Cl_3$ (= 3·49 gm. of crystallized $Au\ Cl_3\ 4\ H_2O$) per litre. The potassium carbonate 12·4 gm. K_2CO_3 per litre, and the potassium ferricyanide 0·11 gm. $K_3\ Fe(CN)_6$ per litre. In every case double distilled water is used.

The films are immersed in this developing solution and heated to 90°C. ; then 4·0 cc. of 1 per cent. fresh formalin solution is added and the mixture kept warm for about three minutes and then the slides washed in distilled water and allowed to dry. The formalin solution consists of 1 cc. acid-free formalin and 99 cc. of distilled water.

Finally the films may be mounted in neutral Canada balsam and examined by means of dark ground illumination.

These methods may be used not only to demonstrate whether any particular gold compound unites with the spirochaetes, but also to study relative localization of gold in the tissues of treated animals, for control preparations made from material not containing gold did not show the characteristic appearance under the dark ground. The authors recommend its use for the study of trypanosomes, tubercle bacilli and similar infections where gold compounds may be of value.

E. H.

ROSENHOLZ (H. P.) & SCHERBINA (L. I.). Zur Frage der sogenannten "Pseudoinfektion" bei Rückfallfieber und ihre chemotherapeutische Behandlung. [**The Problem of So-called "Pseudo-infection" in Relapsing Fever and its Chemotherapeutic Treatment.**]—*Zent. f. Bakt.* I. Abt. Orig. 1935. Apr. 25. Vol. 134. No. 1/2. pp. 42–50.

The injection of mice with blood containing a Russian strain of *S. recurrentis* is said to be followed by a pseudoinfection.

This is characterized by (1) the absence of any incubation period, spirochaetes appearing in the circulation within one or two hours after inoculation ; (2) by the type of increase and decrease in the number of spirochaetes in the peripheral circulation ; (3) by the absence of any immunity against reinfection ; (4) by the absence of any specific antibodies after the disappearance of the spirochaetes ; (5) by the failure to produce any passive immunity with the blood of recovered mice ; and (6) by the failure of salvarsan to have any sterilizing action on these infections.

The latter observation supports the view that the action of salvarsan and similar compounds is linked up with the natural defence mechanism of the host, and consequently when this is not brought into action, as in the case of these pseudo-infections, the drug has no effect on the parasites. *E. H.*

SCHOLER (Hans). Isolierung einer Pseudospirochäte aus dem strömenden Blut bei einer rückfallfieberartigen Erkrankung. [**The Isolation of a Pseudo-Spirochaete from the Circulating Blood of a Patient showing a Type of Relapsing Fever.**]—*Klin. Woch.* 1935. Mar. 9. Vol. 14. No. 10. pp. 333–338. With 1 fig. [22 refs.]

A detailed account of a patient in Basle, who during a period of about 6 weeks suffered from a peculiar type of relapsing fever of obscure aetiology.

Blood cultures were made in Schiödt's medium and on two occasions the author obtained strains of a pleomorphic organism ranging in form from short vibrios 2 μ in length up to spiral forms 30 μ in length, but thicker than ordinary relapsing fever spirochaetes. The inoculation of these cultures into mice, pigeons and guineapigs gave negative results, but when inoculated into the eye of a rabbit a " primary effect " in the form of keratitis and iritis was noticed after 2 to 3 days.

The patient was given injections of " syntharsan " starting on the 27th day of illness ; blood cultures made three weeks after this treatment had begun were negative and the patient's symptoms gradually disappeared.

The nature of the organism isolated by the author remains doubtful, but is considered as possibly related to spirochaetes in view of its characters and also the susceptibility of the infection to treatment with neosalvarsan. *E. H.*

KNOWLES (R.) & BASU (B. C.). **A Blood-inhabiting Spirochaete of the Guinea-Pig.**—*Indian Jl. Med. Res.* 1935. Jan. Vol. 22. No. 3. pp. 449–468. With 2 charts, 3 text figs. & 4 figs. on 1 plate. [19 refs.]

The description of a spirochaete, named by the authors *Spirochaeta cobayae,* found occurring naturally in the blood of a guineapig at Muktesar.

The infection was easily transmitted from one guineapig to another and also to white rats and rabbits by means of blood inoculation. After an incubation period of 2 to 6 days spirochaetes appeared in the blood, were present from 7 to 28 days and then disappeared. The mortality was about 31 per cent., animals dying either at the height of infection or a few days after the spirochaetes had disappeared. Relapses occurred in 9 out of 69 animals. The infection was not hereditarily transmitted, and there was no transmitted immunity. Recovered animals showed a solid immunity.

The spirochaete belongs morphologically to the relapsing fever group and can be readily cultivated in Galloway's medium.

In *Argas persicus* the spirochaete is said to develop in a manner similar to *S. anserina* [see this *Bulletin,* Vol. 29, p. 592], and the

small spirochaetes invade the salivary glands. Although the authors failed to infect guineapigs by the bites of these ticks, the inoculation of emulsions of the salivary glands of the ticks was found to produce infection. *E. H.*

BRUMPT (E.). Présentation de deux *Ornithodorus canestrinii* Bir., 1895, vivants originaires d'Ispahan (Perse). [**Presentation of Two Living** *O. canestrinii* **from Isfahan, Persia.**]—*Bull. Soc. Path. Exot.* 1935. Feb. 13. Vol. 28. No. 2. pp. 51–53.

O. canestrinii was described in 1895 by BIRULA from specimens collected at Teheran in 1839 and in the Caucasus in 1885. Brumpt had ticks collected in Persia and sent to Paris; two females (alive) and one male (dead) proved to be this large Ornithodorus. The females have fed but have not yet laid eggs. Brumpt intends making a study of them and seeing if they transmit *Spirochaeta persica*, the agent of the relapsing fever of Central Asia. He thinks the species must be rare, for it has not been found by the Russian zoologists who have studied the tick fauna of Turkestan. *A. G. B.*

WYNNS (Harlin L.) & BECK (M. Dorthy). Epidemiological Studies on Relapsing Fever in California.—*Amer. Jl. Public Health.* 1935. Mar. Vol. 25. No. 3. pp. 270–276. With 2 maps. [13 refs.]

ZIMMERLI (E.). Is there any Bronchial Spirochaetosis?—*Jl. Egyptian Med. Assoc.* 1935. Jan. Vol. 18. No. 1. pp. 32–38. [See this *Bulletin*, Vol. 31, p. 850.]

RAT-BITE FEVER.

PANDALAI (N. G.). **Observations on the Pathogenicity of the Local Strains of** *Spirillum minus* **to Guinea-Pigs.**—*Indian Jl. Med. Res.* 1935. Jan. Vol. 22. No. 3. pp. 469–473.

Rat-bite fever seems to be not uncommon in Vizagapatam, since about a dozen cases a year go to the laboratory for diagnosis. The author gives details of four cases from which strains of *S. minus* were isolated and studied in regard to their pathogenicity to guineapigs and immunological reactions.

Two of the strains produced fatal infections in guineapigs, another strain a non-fatal infection, whilst the fourth was non-pathogenic. Sub-passages tended to exalt the virulence of the parasite.

Positive Wassermann reactions in many of the infected guineapigs showed that a complement-fixing antibody, identical with the syphilitic reagin in its physico-chemical properties, is produced by infection with *S. minus*. The experimental disease in guineapigs was easily cured by injections of novarsenobillon. *E. Hindle.*

GAUTIER (Claude) & BISSERY. Un cas de sodôku. [**A Case of Sodoku.**] —*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1935. Mar. 11. 51st Year. 3rd Ser. No. 8. pp. 358–363. With 1 chart.

The description of a typical case of sodoku in France in which the infection was acquired in a peculiar manner. Whilst feeding a falcon with a freshly killed rat, the beak of the bird scratched the patient's forefinger, which was covered with the blood of the rat, and after an incubation period of 4 to 5 days he developed a typical attack of the disease, which was cured by intravenous injections of neosalvarsan.

E. H.

GIRARD & PAULICEVICH. Deux cas de sodoku dans la région toulonnaise. [**Two Cases of Sodoku in the Neighbourhood of Toulon.**]—*Marseille-Méd.* 1935. Feb. 5. Vol. 72. No. 4. pp. 156–164. With 4 charts.

A description of two typical cases of sodoku in children, both of whom had been bitten by rats. *S. minus* was found microscopically in the blood, but attempts to infect guineapigs were negative. Both cases responded to treatment with arsenical compounds. *E. H.*

FRANCO (J. Jiménez) & COLICHÓN (Héctor). Periorquitis y edema escrotal consecutivos a la inoculación experimental de *Spirella minus.* [**Periorchitis and Scrotal Oedema after Inoculation with** *Spirillum minus.*]—*Rev. Méd. Peruana.* 1934. Dec. Vol. 6. No. 72. pp. 2180–2186. With 3 figs.

After inoculation of guineapigs with the blood or emulsions of the organs of an animal suffering from rat-bite fever the scrotal or scrotot-testicular reaction is set up, as in typhus, and is with difficulty, if at all, distinguishable from it. Other considerations have to be taken into account. Thus in experimental murine typhus recovery is the rule, most cases of sodoku end fatally; other symptoms—adenitis, blepharitis, emaciation—may assist; the route of inoculation is important, the reaction occurring after subperitoneal injection in the case of typhus, but after subcutaneous inoculation in sodoku. Lastly, the viruses are not mutually protective, an animal after it has been treated by novarsenobillon for its scrotal reaction due to rat-bite virus is still liable to give the reaction again when inoculated with the murine typhus virus. [See also this *Bulletin*, Vol. 30, p. 877.]

H. H. S.

LEPTOSPIROSIS.

UHLENHUTH (P.) & ZIMMERMANN (E.). Beiträge zur Chemo- und Serotherapie der Weilschen Krankheit. [**A Study of the Chemo- and Sero-Therapy of Weil's Disease.**]—*Med. Klin.* 1935. Mar. 22. Vol. 31. No. 12 (1579). pp. 375–377. [14 refs.]

The authors give a brief summary of the results obtained in the treatment of Weil's disease by various bismuth compounds and also by means of immune serum. Their recent experiments show that

three new compounds, "R 141" (Rothmann), also "Bi 5" and especially "Bi 7" (Giemsa) are efficient agents for the treatment of guineapigs infected with Weil's disease, as indicated in the following table showing the results obtained with seven different preparations :—

	Minimum Lethal Dose		Minimum Curative Dose		Therapeutic Index
	Mg. of Compound	Mg.Bi	Mg. of Compound	Mg.Bi	
Bismuth-Yatren A (1% Bi)	0·5–0·6 ccm. solution	6	0·10–0·15 ccm. solution	1·5	1 : 5 (—1 : 8)
R 141 (40% Bi)	30–45	16	5–10	3	1 : 3–1 : 8
R 1220 (22·5% Bi)	200–250	48	about 40–60	11	1 : 3–1 : 5
Natrol (12·5% Bi)	40	5	15–20	2·3	1 : 2–1 : 3
Bi 5 (71% Bi)	about 50	36	6–8	5	1 : 7
Bi 7 (64% Bi)	about 80–100	58	about 8	5	1 : 10–1 : 12

In each case the dose is calculated per 100 gm. weight, and the guineapigs were inoculated subcutaneously with the therapeutic agent 24 hours after having received an intraperitoneal injection of the disease agent. "R 141" is a sodium compound of bismuth-dithio-pyridine-carbonate; "Bi 5" (Pallicid) is sodium tribismuthyl tartrate; and "Bi 7," sodium dibismuthyl tartrate. The latter has the most favourable chemotherapeutic index of any compound tried, but as in the case of "Bi 5" it is advisable to inoculate it intramuscularly, or preferably intravenously, in order to avoid the local necrosis which may follow subcutaneous injections.

The action of immune serum is well known but the authors add some notes on its use in the treatment of human cases of Weil's disease. The serum should have an agglutination and lysis titre of at least 1 : 20,000. Human convalescent serum reaches its highest titre 30 to 50 days after the beginning of the attack. It deteriorates when stored and after 6 months should not be used. Rabbit immune serum gives good results and is now supplied by the I. G. Farbenindustrie (Behring Works, Marburg). The dose is 30–40 cc. of serum injected intramuscularly. *E. Hindle.*

ZIMMERMANN (E.) & ARJONA (E.). Serologischer Titer und Heilwert der Seren gegen Weilsche Krankheit. [**The Serological Titre and Therapeutic Action of Sera against Weil's Disease.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1934. Dec. 31. Vol. 84. No. 1. pp. 111–117.

The authors tested the agglutination titre of various human and rabbit anti-sera and then tested their action in guineapigs inoculated

with the sera respectively 4 or 5 days after being infected with *S. icterohaemorrhagiae.* The results show that the agglutination titre may range from 1 : 160,000 to 1 : 5,000 and is a clear indication of the value of the serum for treatment, but when convalescent serum is going to be used for the treatment of human cases its agglutination titre should not be less than 1 : 20,000. *E. H.*

TROISIER (J.), BARIÉTY (M.) & BROUET (G.). Spirochétose ictéro-hémorragique après morsure de rat. Méningite purulente. [**Spirochaetal Jaundice after the Bite of a Rat. Purulent Meningitis.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1934. Nov. 19. 3rd Ser. Vol. 50. No. 29. pp. 1451–1458.

A detailed description of a fatal case of this disease in a patient who was bitten by a wild rat and developed jaundice 15 to 20 days later. After entering hospital suppuration of the sub-arachnoidal spaces also developed, in addition to the usual symptoms of spirochaetal jaundice. *E. H.*

BARROS (Enrique). Espiroquetosis icterohemorrágica.—Reprinted from *Prensa Méd. Argentina.* 1935. Jan. 2, 9 & 16. 84 pp. With 4 figs. [174 refs.]

REVIEWS AND NOTICES.

BRITISH EMPIRE LEPROSY RELIEF ASSOCIATION. **Dawn; being the Annual Report for 1934.**—36 pp. With 11 figs. 1935. London: 131 Baker Street, W.1.

The British Empire Leprosy Relief Association issues its Annual Report for 1934 under the title "Dawn," suggestive of the more hopeful outlook that the activities of the Association have brought to a class of people suffering from a disease formerly regarded as incurable. In the words of the report "the leper is slowly beginning to feel that he is not a doomed man . . . and that his return to a life of usefulness is not an impossibility."

The year 1934 marks the close of the first decade's work of the association. During these ten years over £18,000 has been given to medical missionaries and others for the erection of dispensaries, hospital buildings and houses for lepers, and more than £5,000, representing several million doses, has been spent in supplying a better and more effective derivative of chaulmoogra oil to those in a position adequately to treat cases. The grants have covered territories as far apart as the Solomon Islands in the Western Pacific, Burma, West Africa, East Africa, Rhodesia and the West Indies.

In India an appeal for funds issued by the Viceroy (Lord READING) brought in a sum of over £160,000 with the result that energetic and sustained action is being taken throughout that great country in the way of research, surveys and the treatment of those suffering from leprosy.

An interesting development of the Association's work has been the foundation of a Special Committee in conjunction with Toc H* to select and train non-medical men recommended by Toc H for employment in leper home colonies, leprosy prevention units, and such like schemes. So far this Special Committee has selected six of the most suitable men from a very long list of candidates. Five of these are now undergoing a nine months' elementary medical training at Livingstone College, Leyton, prior to being sent to Nigeria. The sixth man selected is being sent to the Leprosy Home and Hospital at Dichpali, H.E.H. The Nizam's Dominions, India.

Other activities of the Association referred to in the report are its publications and propaganda, and a tour of the West Indies in 1934 by its Medical Secretary.

The report shows that though much has been achieved by the Association during the first ten years, much more could be accomplished if the funds at its disposal were commensurate with its needs. *R. L. S.*

FRÓES (Heitor P.). **Lições de clinica tropical. Vol. II. Livro I (2a Serie). Estrongiloidíase. Filaríases. Sodóco. Bouba. Micetoma podal. Dermatite linear serpiginosa.** [Lectures in Tropical Medicine.]—pp. vii + 311. With 126 figs. & 2 charts. 1934. Bahia.

The first volume of this work, of which apparently there are to be five when the whole is completed, dealt with malaria. That was issued in 1933. The present treats of infestations by Strongyloides (3 lectures), Filaria (2), with Rat-bite Fever, Yaws (2), Mycetoma pedis (2), and Creeping eruptions (2). The text has been carefully prepared, due acknowledgment is made to research workers in countries other than that of the author, references are abundant and

* 'Toc H' is an organization for social service, founded as a memorial to British youth who perished in the World War.

the information is full, up-to-date and clearly set out. There is little therefore to say except that to those who are conversant with Portuguese the whole will constitute an excellent text-book if the publication of the next three volumes can be expedited; otherwise by the time the last is issued the first will be out-of-date. Where the text is so good it is a pity that, with certain exceptions, the illustrations are so poorly reproduced. Some we can follow after reading the legend, but some, *e.g.*, Figs. 18, 56 and 84 on pp. 63, 178 and 236 respectively, convey nothing to the reviewer even with the aid of the legend subscribed, and presumably the average reader will find similar difficulty in their interpretation.

H. H. S.

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